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COFFEE IN B. C. A.

PAST; PRESENT, AND FUTURE OF COFFEE GROWING IN B. C. A.; CONDITION OF COFFEE GROWING IN OTHER COUNTRIES COMPARED WITH B. C. A.; PROSPECTS OF COFFEE GROWING IN B. C. A.

THE first Coffee Arabica plant introduced into B. C. A. came from the Edinburgh Botanical Gardens in the charge of Mr. J. Duncan, the Church of Scotland Mission Gardener, and was planted in the Mission garden about 20 years ago.

This plant succeeded well, bore heavily, and became the parent, I believe, of all the present existing coffee of that species or variety in this country.

Blue mountain, Orange, Liberian, Sierra Leone, "Standsphyilca," and Maragogipe Coffee have all been subsequently introduced and are to be seen growing on some Estates throughout the country—but although those varieties have been tried on some Estates, they do not seem to suit the climate so well as Coffee Arabica.

The first Coffee garden planted in B. C. A., and it was from the seed of that parent tree (I was informed) consisted of 15,000 plants, which were planted 6 × 6 feet apart giving about 1,200 trees to the acre; so that there would be about 13 acres. I was told that 10 tons of parchment Coffee was secured from this garden, which would be equivalent to about 15 cwt per acre in its third or fourth year.

I have myself seen blossoms on B. C. A. Coffee which should have resulted in crops equal to the above amount.

In those early days the mechanical part of the work was as well done as it is at present, but pruning, handling, manuring, and even weeding were much neglected with the result that, as coffee got older, crops decreased because the health and vigor of the tree were not maintained.

There is no plant or tree suffers so much from bad treatment, or responds so readily to good cultivation, as coffee; and once neglected, especially when young, it seldom recovers.

Until within the past few years enemies of the coffee tree were little thought about, and I venture to say no steps were taken by pioneer planters to fight those pests. But it was considered necessary to cut down the coffee tree after it had borne a few crops. Shade was not thought of either, I believe, until 5 or 6 years ago.

Up to about 10 years ago there was little coffee planting done in the country, and that was done only by the late Buchanan Bros and the African Lakes Co. on a small scale; about 40 acres at Zomba and 100 at Blantyre.

At present the coffee enterprise of B. C. A, is suffering from a good deal of depression owing to four causes:—1st, short crops, owing to bad seasons; 2nd, scarcity of labour; 3rd, low prices.

The first of these we cannot prevent and adverse seasons are to be met with in every country where coffee is grown, resulting in short crops, and sometimes hardly any at all. It is seldom however that two seasons follow each other which are absolutely abnormal, although wet and dry cycles are not uncommon in B. C. A. as in other tropical countries.

An insufficient labour supply is also partly to blame for short crops, because neglected or half-abandoned coffee is more or less choked and cannot nourish and bring to maturity its fruit, as would be the case with well-cared for trees on a clean estate.

The low price of coffee is the result of overproduction which never lasts more than a few years, because large coffee-producing countries cannot cultivate more than will repay

The price of labour soon rises, short deliveries and advance in prices being the result, owing to want of confidence; but a re-action soon sets in as a rule; with a good crop, an efficient labour supply, and good prices, the turn of the tide may be looked for. Such experiences as set forth in the foregoing pages are not uncommon in other coffee-growing countries, but things are usually much more serious, owing to the greater amount of capital invested; so it is to be hoped that our wave of depression will soon pass over and have no disastrous result. From the latest statistics, issued by the London, American, and Continental markets, it is evident that stocks are low and that prices will now improve and be maintained for some years to come.

The future of coffee planting in B. C. A. should not by judged be the results of the past. It may be considered for various reasons (which I shall endeavour as briefly as possible to point out) that we have arrived at a more enlightened stage of this country's coffee culture, and that there is a bright future in prospect for the coffee enterprise here.

The fact has been recognised that a permanent and efficient labour supply must be maintained to warrant success with coffee planting and to ensure remunerative results; and it is believed that the Labour Bureau just formed will in time solve this difficulty; that agents residing on the spot will be able to gain the confidence of the people and supply all the needs of the planting industry, provided they are allowed a free hand by Government.

Amongst enemies of the coffee tree, spotted bug and borer are the two worst; and fortunately they can both be kept in check, if proper measures are adopted by planters and labour is available for the purpose.

It was only *supposed* that spotted bug did harm to coffee, till Mr. K. I. Cameron discovered that they are a serious enemy of no minor importance. I am convinced after careful experiments carried out by myself that those bugs are the cause of much unsound coffee. I also believe that those bugs sucking at the terminal shoots, which form the secondary, lateral and tertiary branches of the coffee tree, disease the sap of those branches, causing black patches in the wood and bark; and that in the course of time the disease spreads with the flow of sap to the fruit, so that all subsequently produced wood yields a light and empty berry as well as barren or bastard wood.

I have proved by experiment that the spotted bugs when imprisoned upon healthy young shoots do disease the bark and suck the wood, and if the experiments I am at present making go to prove that bugs do the same harm when at liberty,—it will certainly revolutionize the coffee industry in the future.

It is not to be wondered therefore that planters, when they discovered that no sound coffee could be got from old trees, cut them down as the only remedy for barren bushes.

I am quite certain that no sound coffee can be got from a coffee tree that has had one or two bugs on it during the blossoming months, and for one or two months after the berries have formed. Then, although the fruit does come forward, it is unsound and worthless

The spotted bug is to be found throughout the year, although not so numerous during the winter months, May to August. During the bush fire months, September to December they fly before the bush fires and find a home and breeding ground in a Coffee Garden.

The Borer longicorn beetle also flies before the bush fires, October to December, and also finds a home on a Coffee Estate where they feed upon the bark of the Coffee trees and lay their eggs.

To ensure success with Coffee in B. C. A. my experience proves that the searching for both bug and borer must be considered by planters one of the most important works on a plantation and if not fought against constantly it is useless expecting mature Coffee trees to yield crops.

If those enemies are carefully and successfully overcome, I am of opinion that there is no need for cutting down or uprooting coffee trees in B. C. A., any more than in other countries, and that a good yield of crop can be maintained without the aid of fertilizers for several years at least.

After the coffee trees on an estate have formed a network of roots in 6 to 8 years, over the available feeding area, manuring and pruning must be done to keep up a good yield.

In this country the cheapest manure available is bush grass, either made into compost with ammonia or applied *green* by digging it in or burying in trenches.

Leguminous crops might also be grown during the rainy season and dug in when matured, saving much wash as well as being useful as a fertiliser.

This country has better facilities for manuring, than any I know of, owing to the extensive area of bush grass surrounding most coffee estates. It has been proved by analysis that green manure is richer than cattle manure.

Both manuring and pruning have been proved to give better results by practical experience; so that any system laid down on paper would not be of much service, for opinions differ, and hardly two men can be got to apply manure or the knife alike.

The climate of B. C. A. is not unlike that of Mysore, Coorg, and Travancore, in India—and the drier parts of Uva, Ceylon. The seasons may be divided as follows:—

15th Decr. to 15th April 5 months' rain, 15th April to 15th July a few showery days each month, 15th July to 1st October occasional showers, 15th October to 15th Dec rainless except for one or two thunderstorms.

May to August are cool and temperate months and sometimes there is frost in June and July.

Blossoms come on coffee August to Nov, and crop April to July.

With regard to the Indian districts mentioned above, most of the Estates were opened by Ceylon men originally, and every stick of timber felled, with the result that after a number of years' cultivation it was found that estates did not pay and total abandonment was the result in most cases. Shade was then thought of and tried and proved a success; many estates that had been abandoned were re-opened, and during the past 15 or 20 years shade has been considered as absolutely necessary for the successful cultivation of coffee, and I believe no coffee is grown now in those districts without a canopy of shade. The climate of B. C. A. during the blossoming months cannot be relied on for rain and they have often 3 or 4 months without any at all. When they do get the rain however they get crops, which was not the case with coffee in the open, as then blossoms and berries too were destroyed by hot winds and sun.

In Travancore I saw myself estates of 200 and 300 acres with hardly a leaf on the trees and laden with blossom to the tune of 7 or 8 cwts per acre, but it was all destroyed for want of rain. Had there been shade on those properties, I was told the blossoms would have been saved.

The climate of B. C. A. in some years is all that could be desired. On the other hand, my experience proves that 6 out of 10 years were bad and unfavourable for the health, vigor, and successful fruiting of coffee without shade, or protection from hot winds.

If shade is too dense, coffee will not yield well at from 2,000 to 3,000 ft. above sea level, although it might do better at a lower elevation. I do not think dense shade is required for the Shire Highlands, and I am of opinion that the silver oak, Grevillea Robusta and the Eucalyptus Robusta, and other red gums would suffice to temper the hot winds and cool the atmosphere on a coffee plantation; provided those trees are planted north and south in lines, and pretty close together.

Grevilleas and red gums do no harm to tea or coffee and have been planted for many years as wind breaks and for timber on most estates in Ceylon and India. Blue gum again cannot be grown with tea or coffee, without starving those products.

Grevilleas and Red Gums do exceedingly well in B. C. A. I have trees of the latter 8 years old, 70 to 80 ft. high and 3 feet in circumference near the ground. The wood is durable and makes excellent furniture &c.

Shade has many advantages over open ground. Weeding is cheaper. There is a litter of leaves always on the ground which can be dug in and buried in holes as manure. There is no wash. Rainfall and the moisture are preserved as well as the fertility of the soil.

It has been shown by analysis that soil on a coffee estate under proper shade is as rich as that of the adjoining forest land. A coffee estate under shade has been known to be abandoned in bad times, and the owner has returned and cultivated his coffee agin and found it as good as when he left it, and perhaps the better for the rest.

All the districts that have been opened for coffee in India and Ceylon have not proved a success; some were too wet, some too dry, some too hot, and, some too cold; and were ultimately abandoned, after much capital had been spent in the hopeless endeavour to get paying crops.

On the other hand large fortunes were made where the soil and climate were suitable for coffee, for there is no agricultural product which pays better under favourable circumstances.

Space will not permit of my entering minutely into details regarding the success or failure of coffee in those districts, which is more the subject for a iteatise on coffee cultivation than an essay, I mention the fact, however, as B. C. A. may have a similar experience.

I may mention a few of the districts in Ceylon where coffee was not a success: Kurunegala, Kegalle, Lower Matale, Dumbura, were all too dry and the blossoms invariably failed. Blossoms would hang in spike for weeks, the same as they do here, and ultimately fail for want of rain at the proper time. Irrigation was tried, and thousands of pounds spent on large schemes but to no purpose.

I have seen blossom come out here repeatedly for 7 to 8 cwts. per acre, and apparently set well, and even come forward to be the size of peas, and the clusters fall off, owing to drought, till reduced to one or two berries and only 1 cwt. per acre got.

The coffee referred to was 3 and 4 years old and planted on Virgin *Forest* land so that the sap could not be said to be weak or lacking in fruitifying power. I never saw finer young coffee anywhere and there was no bug, to speak of; so the climate was at fault, I think.

The opinion is now held by experienced planters in Ceylon that, had the above-mentioned Districts been all opened in shade, coffee would still be in existence.

Too much care cannot be exercised in the selection of land for coffee, and it should not be that which has recently borne a crop of cereals or is otherwise poor in fertilizing ingredients. There are jungle lands to be found in B. C. A. with soil almost inexhaustible. This fact is borne out by the natives growing crops of grain on them for 50 years or more.

As to the age or lasting powers of the coffee tree, I remember coffee in Matale, Ceylon, in 1-89, looking well, with stems as thick as my thigh, whose age could not be less than 80 to 100 years, for they were 15 to 20ft. high and growing native fashion under shade. The yield was not much, owing to leaf disease.

There is coffee, I believe, still in existence in Ceylon, which was planted during the last century; but it must be borne in mind that the coffee referred to is growing under specially favourable circumstances, getting the benefit of leaf mould from village fruit trees enjoying good soil, and not being forced to over-bearing by the hand of the cultivator.

By fighting the enemies of the coffee tree in B. C. A., by liberal manuring and tillage of the soil, by helping one another with information *re* our staple industry, given free and unselfishly, by the adoption of shade to mitigate the evils of our climate, I can see no reason why the coffee industry of B. C. A. should not be as lasting as it is in other countries and as remunerative too.

With better means of transport, and the labour which is used for that work at present set free, and all the pests that the coffee tree is subject to avercome, let us hope there is a bright and prosp rous future in store for the coffee enterprise of British Central Africa.

Before closing this brief essay I would urge upon planters the need for importing new seed, and the most careful selection of sound B. C A. seed for nurseries, as I have no compunction in saying that all barren coffee trees are not caused by bug. So far back as 94, I showed disease in a new clearing and in my nurseries to Mr. J. H. Carson (of the Nyassaland Coffee Co., who has had great experience in Coffee, and he said it was new seed that was wanted and imported Brazilean seed for Leechimya Estate.

HENRY BROWN.

COFFEE IN QUEENSLAND.

From the report of the Instructor in Coffee Culture to the Government of Queensland:—

I have made tours into the surrounding coffee districts, giving advice and demonstration to those who applied for it....In detail, the places visited, and where coffee is grown, include Cooktown, Daintree, Port Douglas, Cairns, Atherton, Myola, Oaklands, Mantaka, Kuranda, Mulgrave, Lower Russel, Clump Point, Mackay, Mount Jukes, Hampden, Rockhampton, Byfield, Yeppoon, Maryborough, Pialba, Bundaberg, Blackall, Coolum, and Buderim. Space would not admit of even short notes regarding each individual district and place where coffee is being more or less cultivated. In general, however, I found from Cooktown southward to near Townsville a zone of country having a somewhat heavy rainfall—eminently suitable for the cultivation of coffee, but possessing a climate that will necessitate artificial methods of drying by means of kilns or drying machinery. At Cooktown and Townsville, and as far south as Rockhampton, the climate is such that there is every probability of growers being able to dispense with kilns and to dry in the open air, which, when possible, is always the more satisfactory method. South of this, again, the absorptive power of the sun is less strong, but, the atmospheric moisture not being great, it is probable that open-air curing may be possible. There is at present scarcely sufficient fully-grown coffee in these parts to thoroughly test this. The majority of gardens are small, though I found several of fair size, the largest being Messrs. Cutten Bros.' estate at Clump Point, of 80 acres; Messrs. De Moleyns Bros., of the Lower Russell, running them very closely with 75 acres. There is very little coffee in cultivation of more than five or six years of age, the majority being either new, in its second year or bearing its maiden crop this season. Some few acres in each of the three districts of Cairns, Mackay, and Buderim may be called old coffee, but their exact age is in nearly every case doubtful. The first coffee-tree ever imported has been pointed out to me, and it is healthy and flourishing; but, as this has occurred in several different localities, its exact age is somewhat vague.

The varieties of coffee to be found are *Coffea Arabica* and *Coffea Liberica*. The former is the principal species, and is the usual coffee of commerce, and the most valuable, growing and cropping readily. It is comparatively easily cured, and, though delicate as a seedling, is hardy enough once it has reached maturity. The latter is the larger and hardier shrub, but is more difficult to pulp and cure, and is only worth about one-third the price of *Coffea Arabica.*

Of *Coffea Arabica* several varieties are noticed:—*C. Arab.* var. *Mocha*, a small stunted-looking and small-leaved tree, slow-growing bearing freely, but having a very small bean; *C. Arab.* var. *Maragogipe*

almost the opposite of the former, being a loosely-knit tree, with large leaves and berries, but somewhat delicate, and a sparse bearer; *C. Arab.* var. *Nalknad*, which would seem to be identical with the varieties known as "Ceylon" and "Java"—a strong, heavily-bearing tree; *C. Arab.* var. *Coorg*, a variety having a very few points of difference from the previous variety, and being also a hardy tree and good bearer; *C. Arab.* var. *Chick*, I have come across in one place only, and this is essentially the worst variety of *Coffea Arabica*, recognisable readily by its primary branches pointing invariably upwards.

Of these, several hybrids are to be seen, especially between the *Nalknad* and *Coorg* or *Ceylon*. These prove somewhat delicate but good-bearing trees. *Chick-Nalknad* or *Chick Ceylon* hybrids are extant, and in every case seem to have been raised from seed obtained from the estate on which some healthy specimens of "Chick" are still to be found. Several young plants are to be seen that look uncommonly like *Maragogipe-Ceylon* hybrids, but which are not yet old enough to identify as such. Such hybrids would probably prove valuable trees, if the bearing capabilities of the *Ceylon* can be combined with the size and quality of the *Maragogipe*. *Arabica-Liberica* hybrids I have not seen in this colony as yet, though experiments are being conducted at the State Nursery, Kamerunga, with a view to obtaining this valuable hybrid.

On the whole, the condition of the estates as I found them was not encouraging—in some cases the weeds were over the coffee. Where the coffee had been kept clean, the growth and bearing were remarkable. For amount of crop the Buderim mountain is noticeable, the quality being also specially good here. On the Daintree River one or two estates that had been kept assiduously free from extraneous growth showed remarkable development, trees of thirteen and fifteen months being topped at 4 feet, having a good spread of secondary growth, and spiking heavily, showing promise of a 5 to 6 cwt. crop that would ripen when the trees were not more than two-and-a-half years old. For all-round good qualities some of the properties in the vicinity of Cairns, specially on the range about Kuranda, are pre-eminent.

To summarise, the area specially adapted to coffee culture may be said to extend from Rockhampton northward to Cooktown, and the principal centres to be at, or in the vicinity of, Mackay, Geraldton, Cairns, and Port Douglas. The places that I have yet been unable to visit are Bowen, Cardwell, Geraldton, Johnstone River, the Bloomfield, St. Lawrence, and Percy Island....Figures regarding the extent of the industry, ... are still necessarily approximate rather than exact; statistics later on.

There would appear to be some 200 growers; aggregating 700 acres or more. I have not included in this the areas that have been allowed to lapse during the past year, and which amount to over 100 acres alone. The industry is now on a much firmer and better footing than last year. I found in some instances that areas had been opened by growers (perhaps in an excess of enthusiasm) without experience, knowledge of coffee culture, or consideration of the natural conditions governing the growth of the coffee-tree, which they were in consequence subsequently utterly unable to cultivate or properly attend to. In such cases I have advised the concentration of attention upon some lesser part of the estate, and the selected portion. The result of such work on the part of the grower has been to reduce the extent of the industry, but to put their estates on an infinitely better footing, financially and otherwise. The increase of area under cultivation is steady, though not rapid, for the same reason. Under my advice, those intending to open up are clearing perhaps 4 or 5 acres to begin with, in the place of 20 or 30, but with the obvious result that what is opened is well cultivated, satisfactory, and in a condition to pay the cost of subsequent openings in due course, instead of large and unsatisfactory estates, which, being difficult to keep clean from the commencement, are ever after a source of extra expense in weeding alone.

The number of applications for seed and advice re opening up is increasing, and the areas reduced will, it is to be expected, be more than made up during the coming year by these new clearings. The value of the industry cannot be gauged by the mere acreage, coffee being considerably more valuable than most farm staples. The area under coffee in the colony at present is capable of giving easily—with ordinary cultivation and no manuring—an average of 10 cwt. to the acre, a crop worth some £20,000, and possibly giving a crop worth at the same cultivation £25,000, to £30,000 annually.

The improved methods of work started last year are showing good results, the samples of coffee at the various shows improving vastly, both in size, shape, and colour, and showing better and more satisfactory returns both to the grower and buyer. At present, practically all the Queensland-grown coffee is bought up and manufactured in the colony, the prices remaining fairly steady at from £56 in the parchment to £112 per ton clean according to sample. Last season some buyers complained of the quality of coffees received, owing to the loss they sustained in both weight and bulk on manufacture. This I found to be due, to a great extent, to the insufficient drying of the crop before hulling. In hulling insufficiently-dried coffee the quality of the manufactured article is seriously impaired, and loss in weight of from 30 to 35 per cent. sustained. It is not always easy for growers to dry thoroughly in bulk, but it was possible to very greatly improve, in this matter alone, on last year's work, and this has been very generally done. Growers see the advantage of drying thoroughly, and having buyers ask again for consignments, and buyers appreciate the absence of heavy losses in weight and possible loss by mould, etc., in storing, an advantage that is satisfactory to both parties, and one that has resulted in an apparently newly-discovered improvement in the quality of colonial coffee generally. The improvement is very noticeable in the manufactured articles now being put on the local retail market.

Coffee is being put on the local market in tins well got up, and of very good quality, at from 1s 6d to 1s 9d per lb. and the local sales of such would tend to show an increase and increasing consumption of the commodity. Local manufacturers are finding, as was to be expected, that they have to purchase from smaller growers to supply the demand—a healthy state of affairs that will, it is to be hoped, continue, enabling small estate owners to dispose at once and for cash of the raw article. Seeing the apparently large price obtained for coffee per lb. manufactured, compared with the price in the raw, there seems to be an inclination among some of the growers to attempt the manufacture individually, which is to be deprecated. The putting on the market of an unlimited number of brands would result, in course of time, in a lowering of prices, adulteration, and reduction of quality. The grower will find it pay better to sell in the parchment than to spend the time in manufacturing small quantities; and *vice versâ* the manufacturer will find that the work entailed and time occupied in manufacturing will not admit of the proper working of an estate for cultivation of the coffee also.

The prospects of the industry are decidedly good. That the sample, when properly treated, is of high-grade quality has been amply demonstrated this season, and, in spite of labour competition in other countries, it has also been demonstrated that the colony's natural advantages can compete with them, by the fact of a high-grade coffee being put on the retail market at the same or a lower figure, with a fair margin of profit to both grower and manufacturer. The removal of intercolonial tariffs will also open up the Australasian markets to this staple of Queensland, and in the home markets the prices are slowly but surely rising.

From the grower's point of view it is one of the most paying of products, giving a return of 10 cwt. and, possibly, a 15 to 20 cwt. crop, which, at even 6d. per lb. in the parchment, or £56 per ton, would

mean £28 gross, or a net return of from £15 to £20, at least, per acre. In the present state of the industry it seems to be inadvisable to open up large areas for various reasons, and smaller gardens are more readily managed. Most of the growers have, at present, also small areas, and, in consequence, coffee is looked upon, to some extent, as a by-product. It will, undoubtedly, prove a very valuable by-product for any farmer, though with due attention to cultivation it will be found, as it is already in several instances, a profitable crop to grow as a sole staple, the returns giving a good living. And as the colony becomes more populated, large areas will be possible where, at present, labour difficulties practically prohibit the opening up of, say, a 100-acre estate.

Want of experience and carelessness in opening up coffee gardens can account for considerable loss and disappointment in the colony, ignorance and inexperience of coffee culture, in many instances, only showing in the second and third year. The necessity for ordinary attention at the area planted up in order to ensure satisfactory results cannot be too strongly dwelt on.

The initial three years or so of waiting before any return can be obtained has, unfortunately, been the cause of the neglect of even the fundamental laws of agriculture, occasionally, with the result that the field has either taken four or five years to come into bearing, or that the trees have been so retarded and hampered in their growth that when the strain of the maiden crop was felt they were found to have no stamina to carry it.

Coffee is perhaps one of the most responsive of any fruit-trees to cultivate and it is certainly one of the most profitable, but at the same time, not being indigenous, is very susceptible to neglect, and easily damaged and stunted by weed growth, etc.—*Planting Opinion.*

COFFEE IN THE SURMA VALLEY.

(*From our own correspondent.*)

Given suitable soil and shade there does not appear to be any reason why coffee should not grow and pay as well in the Valley of the Surma as elsewhere. But suitable soil and shade must be the very first consideration. As we mentioned in our issue of the 16th, the yield per acre in South Sylhet has not as yet been made public. Now we learn that this cannot be done, for the simple reason that the most of the land planted has been put down with the Liberian species 10′ by 10′ apart and the spaces between filled up with Arabian as a catch crop. Under the circumstances it would be difficult, if not impossible, to give a definite estimate of what may be reckoned on per acre. We have advocated, when putting down fresh plants to introduce the best Jamaica procurable, as the finest of this is now quoted on the London market at $125 per cwt. Of course it is possible, we may say very probable, that the species which brings a top price when grown in Jamaica might turn out an entirely different berry if grown in South Sylhet. Given the soil and climate, elevation is now looked upon as only a secondary consideration. Formerly it was found that coffee was better flavoured when grown at considerable elevations above sea-level. But the fact was generally lost sight of that at the highest elevations the most suitable flavouring soils, as a rule, were to be found. Coffee of any species when grown upon strong alluvium naturally will not, as a matter of fact does not, produce such a well-flavoured berry as when it is grown upon soil which, to a certain extent, is composed of humus. The Liberian berry has been recently described as a heavy enough bean, but wanting in flavour; but we have been assured that when this species is grown upon a light laterite, which has been under forest, it has even a superior flavour to a great many of our Arabian growths, which are famed for their flavour. The flavour of the Liberian bean, even when grown upon alluvial land, is said to be improved so much when kept in the parchment and thoroughly seasoned, that it compares very favourably with good Arabian. Be this as it may, there is no doubt about all the species improving much in flavour by keeping the beans in the unroasted state. Botanists, it would appear, have enumerated about sixty species of the genus coffee, and these are spread over various countries in both the Eastern and Western hemispheres. According to a well-known authority, most of these must be mere varieties resulting from accidents of soil, climate or cultivation, produced subsequently to the naturalising of the plant, for we know that all the coffee trees now grown in America and the West Indies are the progeny of one plant introduced in the year 1714, and yet botanists have individualised no less than sixteen species in Brazil alone and nine in Peru, whilst in the East Indies we have seven, and Africa is credited with five. Among the Indian species at least one, *C. Bengalensis*, Roxb., is a native of Sylhet, and in former time used to be cultivated in Bengal. But all the species most valuable for economic or commercial purposes are confined to Africa, or are of African origin. So intending growers of the flavoury berry in South Sylhet have a large enough number of species to choose from to suit their soil and climate. The choice of a suitable species is by no means the least important thing to be taken into very careful consideration. Although the present season's long drought is by no means normal, and cannot be taken as the average of the South Sylhet climate, still it must be always borne in mind that such a spell will be experienced from time to time. There are species, if not varieties, of our finest coffees which stand drought and certain conditions of soil and sunshine better than others. A writer recently accounted for the Arabian species standing the drought better in South Sylhet than the Liberian, because the latter was essentially an evergreen tree, and that the Arabian was either deciduous or otherwise according to climate, soil and general environment. Although this may be to a certian extent quite correct, we would point out that there are certain kinds of coffee which stand sunshine much better than others, and are more productive when exposed than they are when shaded. On the other hand, again, there are kinds which will not thrive at all unless they are grown under shade. We are inclined to think that a moderate shade, that can be thinned when necessary, will be found to be a *sine qua non* to successful coffee culture in South Sylhet. We wish the pioneers of this and other industries in that district every success. Coffee is by no means the only product which is being tried. Some of them already give promise of becoming very important staple products, which will not be limited to the Surma Valley, and we hope to be enabled to congratulate the district of South Sylhet upon being in the very forefront of success, as it certainly deserves to be for its tropical agricultural enterprise.—*Indian Planters' Gazette.*

INTENSIVE CULTIVATION.

In most progressive countries, more attention is being paid to improved methods of cultivation, by greater care in the preparation of the soil, selection of the choicest seed, and more intelligent care of the growing plants. The history of the sugar beet perhaps affords the best illustration of this. But it pervades every branch of agriculture, including fruits, flowers, etc,—in all which new and unlooked-for developments are every year recorded, increasing the value of such products, whether for food or in the arts and sciences. In no other branch of agricultural industry has there been greater progress than in the culture of beets and the manufacture of sugar from them. The result is that every year shows gain, the latest being seen in the reports of the French exposition on beet culture and manufacture. But while these evidences are more conspicuous on account of the magnitude of the beet sugar industry, yet the remark applies equally to cane, and almost

every branch of agricultural industry. The man who is most successful is he who supplies the necessary food and stimulants demanded by each product, and by returning to the soil what each plant has absorbed from it.

In remarks made at one of the planters' gatherings in Louisiana, Prof. Stubbs expressed surprise that Hawaiian planters did not cultivate pea vines and other plants for soil manuring. Had he visited Hawaii he would have seen lupins growing and used successfully for this purpose, which has been done for several years, and with as good results as in other countries. The practice is extending each year to all the islands. Prepared manures, made expressly to suit the needs of each estate, have generally been preferred on account of the good results attending their use. The needs of the soil of different localities here are so varied that it is only by actual test that the best can be determined. In Louisiana the soil of large sections may be of one class—alluvial perhaps, while here the soil of no two islands, or even districts, is the same. The chemist is employed on each plantation, and his investigation generally determines what manures are best adapted to it. The result is that each estate which is so equipped and conducted secures large returns in its annual crops.

THE FLORIDA ORANGE.—A piece of news in a small way that will be deeply appreciated is the announcement that Florida will have an orange crop of 1,000,000 boxes this year, the largest yield since the great freeze. One million boxes is not much in comparison with the 1894 crop of 5,000,000, or the last big yield, but it is about four times as large as the production of 1899. The 1901 yield, it is estimated, will reach 1,500,000 boxes. From this it may be seen that the Florida groves are being rapidly restored. In a few years the output will be larger than it ever was before, and the delicious fruit will once more abound in the market. The Florida orange is the queen of fruits. All the grapes and figs and dewberries that were ever grown are not equal to one perfect orange with its golden rind packed full of the sweetness and exquisite flavor of the tropics. What makes the orange so welcome is that it comes to the North in the holiday season, reaching here about Thanksgiving Day and being most perfect just at Christmas time. The oranges of California, though very good, are inferior to the Florida product.—*Louisville Journal*

RAFIA FIBRE IN MADAGASCAR.

Rofia, or as it is generally spelt "rafia," is the Malagasy name of a palm which furnishes a staple article of commerce, called rafia fibre. It is indigenous to Madagascar, and is to be met with everywhere on the coasts, needing neither cultivation nor attention of any kind. It is not a stately palm, but sends its enormous branches from near the ground; in a fine specimen one branch is almost a tree in itself. The rib in each branch is as much as 20 feet long, of a pearly grey colour, smooth and shiny, flat on the inner surface, but otherwise round, without any knobs, and so exceedingly hard. At the base it is as large as an ordinary champagne bottle, and tapers to a point at the top. The inside consists of a light pith, which can be spilt into layers of any thickness. Possibly, says the the United States Consul at Tamatave, it is this, or an analogous production, which is used in making pith helmets in the East. Naturally these ribs combine great strength with wonderful lightness, and are used for shafts for "filanjanas" or palanquins, ladders, or other purposes, but otherwise have no particular commercial value. It is the pinnifoliate leaf of these branches which produce the rafia fibre of commerce. One palm branch, or frond, will produce eighty or hundred long green leaves from two to five feet in length, like the leaves of the sugar cane, but of a dark, lustrous green, and both thicker and stiffer. These, again, contain a round and pliant rib which the natives utilise for making baskets and dredges for catching small fish and shrimps in the rivers after they have stripped off the green part which furnishes the fibre. The under part of this green leaf (which is not exposed to the light, as it remains folded) is of a pale greenish-yellow colour and from that side the inner skin can be peeled off in the same manner as the skin on the outside of a pea pod, except that it peels off straight to the tip without breaking. It is then of the palest green, and after being dried in the sun assumes a light straw colour. This is the rafia fibre of commerce. It was originally sought for by the natives for use in articles of clothing. The men bring in the fronds, and women and girls weave it on handlooms, of any coarseness or fineness. Woven just as it is peeled off from the fronds, it forms a kind of sacking used for wrapping goods, while the perfection of the art, as known by the Hovas only, is to weave a tissue of which the warp is rafia fibre split very fine, and the weft of white silk. This gives an article called silk lamba, which fetches fancy prices in Europe and America. The coast tribes use it for clothing, but of moderate fineness, with dyed stripes of indigo, saffron, black, and a dirty green. It is a cold, comfortless looking material, and refuses to adapt itself to any folds that a sculptur would care to copy. Rafia fibre is used in Madagascar by nurserymen, gardeners, &c., for tying up vines and flowers, and possibly for grafting. It possesses the advantage of being as soft as silk, and is not affected by moisture or change of temperature so as to risk cutting or wounding the most delicate tendrils, and it does not break or ravel when folded or knotted. These qualities bring it into use all over Europe and consequently maintain its price. It is virtually inexhaustible in Madagascar, the supply being limited only by the scarcity of labour. For export, the fibre is merely collected in large skeins twisted up or plaited, and then baled like raw cotton. Madagascar exports about 20,000 bales annually.—*Journal of the Society of Arts.*

BANANAS AND FIGS.

Attention has been called to the drying of tropical fruits, including those named above. Both cooking and eating varieties of bananas grow readily here, and could be made a profitable business for export, by drying them as is done in other countries. No healthier fruits can be found than the two mentioned, nor any better adapted for exportation, as both, when properly cured and packed, will keep in good condition for one or two years. Some forty or more years ago there was a family living in Kona, Hawaii, which dried bananas in the sun and packed them for export or local consumption. The fruit there put up was much relished, and found ready sale in Honolulu. Owing to the duty then imposed on dried fruits in the U. S., the business was finally given up. The Smyrna fig ought to be cultivated here now, as it can be had from California, where it grows and bears as well as it does in Smyrna, where it originated. A very interesting article on the introduction of this variety into California will be found in this issue of the "Planter," and we advise all who are interested in fig culture to read it, and learn the peculiarities of this—the finest kind of fig grown. Mr. Koebele brought from California specimens of the fruit now grown there. Nature, in this instance, provides in a most wonderful and intricate method for the perpetuation of the choicest fruit of this description known. Prof. Koebele was wise in not importing woodpecker birds, which Dame Rumour stated he intended doing but of which he had no thought, as he knew them too well. They are handsome birds and, like most others of their kind, live on insects, some of which they dig out from under the bark of trees—hence their name. In this connection it may be asked what

has become of the mynah birds, which formerly were so numerous here? Can it be true that the rats and mongooses attack them while asleep on the trees, where they are accustomed to roost? The mynahs are harmless, living mostly on ground worms and other insects which infest flower bushes and vegetation. Birds have their uses, but throughout the islands they are becoming more and more rare, excepting doves and pigeons and migratory birds, which seem to hold their own.—*The Hawaiian Planters' Monthly.*

THE TREATMENT OF GRASS LAND.

Experiments have been carried out in Berar by the Forest Department to determine the relative yield of dry fodder per acre from (1) areas annually burnt over, (2) areas burnt over and subsequently grazed over, and (3) areas neither grazed nor burnt. The results obtained are reported on as follows, by the Conservator of Forests, Hyderabad Assigned Districts:—

"The experiments regarding the treatment of fodper grass areas in Amraoti were continued with the following results;—

Plot (B State-forest).	Out-turn of dry fodder, in pounds, per acre. 1893.	1894.	1895.	1896.	1897.	1898.	Average last five years.
I—In the area burnt ..	2,736	2,501	1,091	739	2,558	2,850	1,948
II—In the area grazed ..	2,668	2,338	1,223	988	1,919	2,702	1,834
III—In the area cut over and neither grazed nor burnt.	2,386	2,417	1,228	755	1,825	2,268	1,703
Average ..	2,597	2,419	1,181	834	2,101	2,607	1,828

"The experiments have been carried on over five years of varying rainfall and growth, and will now be discontinued. They tend to prove that burning gives the highest yield, but that grazing down the stubbles (without, of course, injuring the roots by excessive trampling) gives a fair average yield. In Berar sufficient grazing is accordingly being tried in "ramnas" that lend themselves to this treatment."

These experiments merely relate to quantities of fodder produced. No account is taken of the quality of the grass, and it is a pity this question was not dealt with in carrying out the above experiments. There is a widespread notion in India that burning of grass lands is necessary, in order to improve the grazing. This, however, it does not do, as has been conclusively proved in Madras. In reality, by firing the grass, most of the delicate annuals, such as *Panicum Oplismenus, Isachne, Poa, Eragrostis*, etc., which are especially good for cattle, are destroyed, while the coarser kinds, such as *Andropogon, nardus* and *Schœnanthus, Apluda aristata, Chrysopogon sp., sp., Imperata arundinacea* and *Anthistiria ciliata*, which are not so good for fodder, and of which only the young shoots are eaten, are encouraged. We should be glad to see some experiments carried out on these lines in Berar.—*Indian Forester.*

THE DETERIORATION OF PASSION VINES AND FRUIT.

W. J. ALLEN

Last season growers of passion-fruit in the Dural, Galston, Arcadia, Glenorie, Kenthurst, and other districts suffered much loss from a trouble which affected their vines and brought about the production of malformed, unsaleable fruit.

The disease is characterised by a thickening and hardening of the rind to such an extent that it more resembles a smooth bark than anything else, and in fact has been named by some of the growers as "ironbark" fruit. Only a small proportion of the fruit develops properly, most of it being undersized, ill-shapen, contorted, and with little or no pulp. The disease makes its appearance soon after the fruit has set, and can be easily distinguished then, the vines also showing its effects by an improperly developed appearance, the leaves being small. In many of the vineyards, an occassional vine is found dying from the effects of a disease resembling very much the disease known as Mal di Goma (collar rot), which attacks the citrus trees just above the surface of the ground.

I regret to say that harvesting of the spring crop had just been completed when I visited the districts named, so that I did not see to what extent the crop had been damaged; nor have I been able to trace this "ironbark" disease to any one cause, but am of opinion that a multiplicity of causes are accountable for the falling-off of some of the vineyards, chief among which are the following:—

I.—Planting in exposed positions, where the vines are subject to high winds.
II.—Frosts and cold weather during winter and at time of blooming.
III.—Heavy, cold, and poor soils and subsoils.
IV.—Improper fertilizers or neglect to supply sufficient, if any.
V.—Insufficient moisture owing to hot, dry summers.
VI.—Not selecting soils and positions most suitable for the passion-vine.
VII.—Age of vines.
VIII.—A fungus disease.

Treating of these causes separately, I find as regards—

NO. I *Exposed positions.*—In a few instances I saw vineyards situated in very exposed positions, and where they were subjected to very heavy winds, which are detrimental to vineyards, and particularly to those planted on indifferent soils, where the growth is less vigorous and less able to withstand the strong winds. The consequence is that vines planted in such positions, and in such soils have, after the first year or two, borne more or less valueless fruit.

NO. II. *Frosts.*—In some districts during the fall and winter frosts are of frequent occurrence and these are very severe on the vines, often causing the vine to lose nearly if not the entire crop, and also causing the vine itself to split open and crack in different places, and the death of all undergrowth and small lateral branches.

When cold winds and cool nights prevail at the time of setting—particularly at the time of setting of the crops which have just been harvested—it is noticed that the fruit produced has a

large percentage of worthless fruit, especially so on old vines which have become impoverished through age or lack of proper fertilizers. The succeeding crop, viz., that which is just now setting, is comparatively free from these worthless fruits.

No. III.—*Heavy, cold, and poor Soil and Subsoil.*—On such soils the vines have, after the first couple of years, steadily gone back, producing small crops of fruit which in many instances are almost wholly worthless, especially as regards the Easter and Spring crops.

No. IV. *Improper Fertilizers, or neglect to supply any.*—Vineyards planted in any soil show signs of distress sooner or later unless they receive a liberal dressing of manure periodically, and it is claimed by some that rows which have been well dressed with kainit and other manures rich in potash have produced heavy crops of good fruit, while adjoining rows which were unmanured had a large percentage of poor fruit. In fact, the growers are at one in their opinion on manuring, and assert that to grow good crops they must manure, and that where this important work is neglected the vineyards soon weaken and cease to produce either good crops or good fruit, such as are generally taken from all vineyards the first year or two.

No. V. *Insufficient Moisture, &c.*—Many of the growers attribute the failure to the excessively dry summers which have prevailed lately in many districts, and say that the vines did much better with them in those years when occassional soaking showers fell during the summer.

No. VI. *Soil and position best adapted for the Passion Vine.*—The soil which has been found best adapted for the growth of the passion vine is a rich, loamy soil, or sandy loam with a good natural drainage. In these soils they will live and continue to bear good crops from six to ten years, and on such soils there is the least diseased fruit found. They may also be found doing very well on poor light soil, but when they have exhausted the soil, which they do in a year or two, they must be constantly manured to keep them in a healthy and profitable condition, and as this vine produces three main crops of fruit each year, unless the land is very rich it soon exhausts itself if not well fed.

No. VII. *The life of the Passion Vine.*—The age to which this vine produces the best fruit, and when least woody fruit is noticed is during the first four years of its lifetime. In some vineyards, on rather poor soil, a shorter period (from two to three years) exhausts its productiveness, and on good soils, or those which are well manured, there are vineyards which have produced good crops up to twelve years old, but, generally speaking, the older the vineyard the more susceptible it has shown itself to woody or diseased fruit. It is therefore best to renew the vines before they become too old.

No. VIII. *Fungus Disease.*—An examination of the stalks and leaves of the passion vine revealed a fungus disease, which may or may not be the cause of the ill-shaped fruit. This is for the Pathologist to determine.

I do not consider this partial failure of the passion vine in a few of the vineyards to be a very serious matter. Many of the vineyards have been planted among trees, and as these attain to any size, there has not been sufficient moisture to keep both going properly, and the vines have become weakened, and suffered accordingly. In such instances a large proportion of the fruit has become diseased, and of no commercial value. The growers, however, are alive to the fact that they cannot continue to grow trees and vines together for more than three or four years without seriously damaging them, and consequently many of them are now taking out vines from between bearing trees.

As this vine does particularly well under ordinary conditions, bearing three large crops of fruit each year, that is to say in an almost perpetual state of fruit-bearing, it is not to be expected that it can keep up this strain without the application of proper fertilizers; therefore, at least every year, suitable manures should be applied, and as potash manures have given good results, I would recommend their use.

Pruning should not be neglected, as an unpruned vineyard with a lot of dead and useless laterals furnishes a harbour for disease, and the unpruned vines do not continue bearing or growing so well as do those which are well pruned back once a year.

For the fungus disease I would recommend a spraying with Bordeaux mixture (summer strength) just before each of the main crops blossom, and another as soon as the crop is fairly well set. This would not be found very expensive, and should be the means of keeping the vines fairly clean of fungus diseases.—*Agricultural Gazette of N. S. Wales.*

THE POSITION IN CASSAVA.

A recent analysis made by Professor Carmody, Government Analyst, confirms the previous work of Francis as to the presence of Prussic acid in sweet cassava, the proportion found varying from 0·005 to 0·019 per cent. The skin was found to yield from 0·014 to 0·042 per cent., while the inner part gave only 0·003 to 0·015 per cent. The interior part of bitter cassava yielded 0·013 to 0·037 per cent., while the skin and outer layer yielded from 0·012 to 0·035 per cent. Peeling sweet cassava before cooking is therefore a wise precaution. Professor Carmody also suggests that the acid may in part be formed by fermentative change.—*Trinidad Bulletin.*.

THE METRIC SYSTEM, whatever may be said against it, is so infinitely more convenient than our present idiotic weights and measures, that it is very wonderful that even British conservativeness should have been able so long to obstruct so practical a reform. Other countries have adopted the metric system with little difficulty, and not one has evinced the slightest wish to return to chaos.—*Gardiners' Chronicle.*

GUTTA CULTIVATION IN JAVA.—The subject of gutta-percha cultivation in Java has been brought before the States General. The Minister for the Colonies explained that the Government intend to start gutta-percha plantations in Java only. There the soil and climate favour the undertaking, and labour is cheaper than in Sumatra and Borneo. A beginning will be made with planting on a large scale the *palaquium* variety, which has been found to thrive very well. Within the next five or ten years, it is intended to plant large areas with three kinds of this variety. The Director of the Government Botanical Gardens at Buitenzorg will be charged with the supervision work at the outset.—*Planting Opinion.*

Wilson, Smithett & Co.'s Ceylon Tea Memoranda for 1900.

Summary of Ceylon Tea sold at public auction in London between January 1st and December 31st, 1900, estimated quantity in lbs. and average prices realised :—

Average Price for the Year was 7·25d per lb., against 8d in 1899 and 7·78d in 1898.

The initial letters following the estate names refer to the mean elevation, as follows :—

L (low) sea level up to 1,000 feet HM (high medium) 2,500 to 3,500 feet HH (highest) above 5,000 feet
M (medium) 1,000 to 2,500 feet H (high) 3,500 to 5,000 feet

Over 1,000,000 lbs.

	1900 About lbs.	Av. price per lb.	1899 About lbs.	Av. price per lb
Diyagama ... H	1,066,000	9⅞d	973,000	9¼d

Over 500,000 lbs.

	1900 About lbs.	Av. price per lb.	1899 About lbs.	Av. price per lb
Badulla............... H	540,000	6⅜d	354,000	7¾d
Campden Hill ......M	501,000	6½d	463,000	7½d
Culloden...............L	589,000	6¼d	425,000	7d
Demodera ....H	605,000	7⅜d	346,000	8⅜d
Elston..................L	575,000	6¾d	385,500	7¾d
Hauteville ....H	590,000	9½d	556,000	9¾d
Kurugama........... L	675,000	6¼d	642,000	7¼d
Mattakelly............H	712,000	8¼d	606,500	8⅜d
Meddecombra ......H	756,000	7¼d	782,000	7¾d
New Peradeniya ...M	618,000	6¼d	524,000	7⅛d
Pitakande .... HM	594,000	5¾d	511,500	6⅞d
Shamrock ....M	529,000	5⅝d	479,500	7d
Sunnycroft............L	585,000	6⅜d	433,500	7⅜d
Walpola... L	537,500	6d	408,000	7d
Yataderia..............L	672,000	5¾d	363,000	7d

350,000 lbs to 500,000 lbs.

	1900 About lbs.	Av. price per lb.	1899 About lbs.	Av. price per lb
Bandarapolla......HM	494,000	5¾d	459,000	6¾d
Belgravia...............H	432,000	8¾d	338,000	8¾d
Castlemilk............M	428,000	6⅜d	358,000	7⅜d
Craighead.............M	400,500	7¼d	323,500	8d
Degalessa...............L	455,000	6⅜d	406,500	7⅛d
Drayton.............. H	379,500	8½d	386,000	9d
Dunsinane............H	365,500	9½d	403,000	8⅝d
Elkadua........... HM	379,500	6d	297,000	7¼d
Fordyce ....H	387,500	7⅞d	317,500	8½d
Galaha ....M	463,000	6¾d	587,500	7½d
Gallamudina.........M	367,000	7d	323,500	7½d
Great Western...... H	370,000	9½d	288,000	9¾d
Gonakelle ....HM	469,000	7½d	318,500	8⅛d
Hemingford L	483,000	5⅞d	424,500	6⅞d
Imboolpittia ....M	381,500	6½d	340,500	7⅜d
K. A. W............HM	421,000	6½d	509,000	7½d
Kellie....................M	368,500	6¼d	343,500	7¼d
Kirkoswald ....H	479,000	7¾d	378,000	8¼d
Laxapana ....H	352,000	6⅞d	269,500	7¾d
Le Vallon ....HM	422,500	7¾d	357,000	8⅜d
Loolecondera.........H	379,500	7¼d	261,000	8d
Mariawatte ....H	377,500	6⅜d	311,000	7⅜d
Mooloya ....H	387,500	7¾d	299,000	8⅛d
Mount Vernon.......H	368,000	8¾d	357,500	9⅛d
Nilambe........... HM	365,500	6⅜d	328,500	7⅜d
Poonagalla.........HM	397,000	6¾d	126,000	7¾d
Ragalla ....H	384,500	9⅜d	334,500	9½d
Rangbodde ....H	375,500	6¾d	321,500	7½d
Rothschild........... H	364,000	6⅝d	387,000	7½d
St. Leonards ......HH	483,000	10¼d	511,500	10½d
Spring Valley.......H	429,000	7¼d	442,000	7¾d
Talawakelle ....H	402,500	11⅛d	374,000	10⅝d
Tangakelly............H	404,500	9¼d	290,000	9⅝d
Tillicoultry ....H	430,500	9⅝d	303,000	10⅝d
Ukuwella...............M	355,500	5¾d	68,000	6⅝d
Vellai-oya ....H	441,000	6¾d	404,000	7½d
Wanarajah............H	383,000	9⅞d	319,500	9¾d
Waverley ....H	401,500	10d	358,000	10d
Wattegodde ....H	405,500	8¼d	310,000	9⅛d
Westhall............HM	355,000	6⅝d	347,500	7½d

200,000 to 350,000 lbs.

	1900 About lbs.	Av. price per lb	1899 About lbs.	Av. price per lb
Abbotsleigh...........H	251,000	8½d	187,000	9⅛d
Adam's Peak ....H	219,500	7⅜d	184,000	8d
Alacolla.............HM	203,500	5⅞d	196,500	6⅞d
Ambatenne............L	240,000	5⅞d	220,500	6⅞d
Atgalle ....M	248,500	6½d	127,500	7⅝d
Ayr L	243,500	6d	221,500	7d
Antony Malle........M	239,500	6⅝d	37,000	7d
Abamalla...............L	205,500	6d	148,500	7d
Battagalla.............M	221,500	6¼d	239,500	7¼d
Battalgalla............H	210,500	8⅛d	183,500	8¾d
Barnagalla ....M	205,500	7⅛d	199,000	8d
Benveula ....M	211,000	5¾d	218,500	6½d
Beaumont.............M	241,500	6¼d	330,000	7¼d
Blackstone............H	218,500	6⅛d	191,000	7⅛d
Blair Athol............H	200,000	6½d	126,000	7¾d
Bogawantalawa ......H	313,000	7½d	246,000	8¼d
Bogawana.............H	251,000	7¾d	202,000	8½d
Burnside Group ....M	307,000	6¼d	236,500	7⅛d
Bridwell...............H	269,500	7⅝d	190,500	8⅝d
Campion...............H	324,500	8½d	272,000	9½d
Cannavarella.........H	307,000	9d	237,000	9⅛d
Chapelton.............H	304,000	7⅞d	291,000	8½d
Concordia............M	230,000	11d	181,000	11¼d
Clydesdale ....H	259,500	8⅞d	217,500	9¾d
Cocagalla ....HM	305,000	7⅞d	215,500	8⅛d
Cranley.................H	252,000	9½d	281,500	10⅛d
Darawella .... H	215,000	7¼d	211,500	8d
Dartry ....M	270,000	6¼d	350,500	7½d
Debatgama............M	209,000	6d	170,500	7⅛d
Delmar..................H	289,000	10d	201,000	9¼d
Delta ....H	248,000	6½d	217,500	7¾d
Deviturai ....HM	200,500	6⅝d	171,000	7⅝d
Dewalakanda.........L	276,500	5¾d	268,500	7d
Digalla L	202,000	6d	195,000	7d
Doteloya .... M	269,000	5¾d	174,000	6⅞d
Duckwari...........HM	346,500	6⅜d	262,500	7⅜d
Dunedin................L	233,000	6⅛d	208,000	7d
Ederapolla L	257,000	6d	199,000	7¼d
Ellekande..............L	246,000	6d	205,500	7d
Elangapitiya.........M	213,500	5¾d	195,000	6⅜d
Elbedde ....H	284,500	8¼d	232,500	8½d
El Teb...................M	329,000	6¾d	221,000	7½d
Ernan L	310,500	6⅛d	299,500	7d
Gallebodde ....M	251,000	8d	226,000	8½d
Gammadua............H	316,000	5¾d	250,000	6¾d
Gikiyanakande.......L	316,000	6⅝d	278,000	7½d
Glanrhos...............L	208,000	6d	113,000	7⅜d
Glenugie ....H	224,500	8⅝d	212,000	8⅝d
Glenlyon ....H	202,000	9⅜d	272,000	9¼d
Goorookoya ....M	342,500	6¼d	318,000	7½d
Gouravilla ....H	335,000	7½d	275,000	8¼d
Gordon ....HH	259,000	8⅜d	90,000	9⅝d
Glen Alpin..... ......H	315,000	6¾d	208,500	8d
Halwatura.............L	235,500	5⅝d	114,000	6⅞d
Hantane................M	209,000	5¾d	169,500	7d

	1900 About lbs.	Av. price per lb.	1899 About lbs.	Av. price per lb
Hatale..................... H	251,000	6d	224,500	7⅛d
Heatherley.........HM	268,000	6d	228,000	7d
Henfold...,...........H	260,500	11d	234,500	11d
Hoonoocotua.........H	289,000	6⅜d	277,000	7¼d
Holyrood East...... H	284,000	9¼d	278,500	9¼d
Hope.....................H	317,500	7⅜d	300,500	7½d
Havilland.............M	212,500	6d	100,000	7d
Invery.................. H	276,000	7½d	222,000	8¾d
IMP.......................H	345,500	6⅞d	323,000	7½d
Ingoya.................. M	256,000	5⅝d	168,000	7⅛d
Kadien Lena...,.... M	344,000	6¼d	307,000	7½d
Kandanewera......HM	271,000	6½d	286,000	7¼d
Kataboola............ H	203,500	7d	169,000	7¾d
Kehelwatte........... M	229,000	7¼d	142,000	8⅛d
Keenakelle........... L	217,500	6⅜d	170,500	7½d
Kelburne...............H	238,000	7⅝d	139,500	8d
Kelliebedde...........H	211,500	10⅜d	163,000	10⅜d
Knuckles Group..HM	303,500	6¼d	238,000	7¼d
Kotiyagalla.......... H	343,500	8⅞d	325,500	9⅜d
Katooloya.............H	229,000	6⅞d	266,000	8d
Kottagodde...........H	204,000	6⅞d	—	—
Ledgerwatte..........M	300,000	7d	27,000	8⅛d
Labukelle.............H	263,500	7¼d	173,000	8⅜d
Lavant.................. L	258,000	5¾d	174,000	6¾d
Lawrence............. H	222,000	7⅜d	164,500	8¼d
Lippakelle... ....H	250,000	10⅜d	—	—
Lindoola...............H	205,000	8¾d	180,500	8⅞d
Luccombe..........HM	238,000	6⅝d	251,000	7¼d
Mahadowa............H	348,000	8⅛d	301,000	8⅜d
Mahaousa.............M	221,000	5⅜d	154,500	7¼d
Mahaoya.................	290,000	5⅞d	154,500	6⅞d
Mayfield............... H	223,500	7½d	251,000	8⅛d
Melfort............... M	200,000	7⅝d	148,000	8⅜d
Meeriabedde......... H	256,000	6¾d	169,000	7⅝d
Mossville..............M	304,000	6⅝d	243,500	7⅝d
Nikakotua.............L	257,500	6d	180,000	6⅞d
Nayabedde........... H	200,000	9⅛d	161,500	9½d
Nayapane...........HM	259,500	6⅛d	251,500	7d
Needwood.............H	339,000	6⅞d	216,000	8d
New Peacock........ H	280,500	7⅛d	241,000	7¾d
Nicholaoya.........HM	217,500	7d	219,000	7d
Norwood..............H	346,500	7⅞d	281,500	8⅞d
Ouvahkellie......... H	209,000	9⅝d	215,500	9d
Orion....................M	202,000	6⅜d	170,500	7d
Pambagama...........L	264,500	5⅝d	190,000	7d
Pantiya..................L	268,000	6d	222,500	7⅛d
Parragalla..........HM	265,500	6⅝d	255,000	7⅜d
Penrith.................L	238,500	6⅛d	228,000	7d
Pen-y-lan..............M	288,000	6⅛d	238,500	7⅜d
Peradenia............ H	222,500	7d	224,500	7¾d
Portmore............. H	263,500	10⅜d	234,500	10⅛d
Pussetenne............M	249,000	5⅞d	163,000	7¼d
Queensberry..........H	338,500	7⅜d	329,000	8½d
Rangalla............HM	242,500	7½d	163,500	8d
Rosita....................H	288,000	7⅝d	251,500	8⅛d
Rutland.................H	282,500	6¾d	194,000	8d
Sandringham......... H	340.000	9d	245,000	9⅝d
Sanquhar............H M	249,000	6⅝d	242,000	7⅛d
St. Andrew's(Mask)H	204,500	7⅛d	112,500	7⅞d
St. Clair.............. H	289,500	8⅝d	377,500	9⅜d
St. Clive.............. M	254,000	5¾d	187,000	6¾d
St. John del Rey....H	311,500	8⅜d	238,500	8¾d
Sheen....................H	211,000	9¾d	179,000	10d
Sogama..............HM	314,000	6⅝d	251,000	7⅛d
Stonycliff .... H	242,500	8d	199,500	8⅜d
Sorana................... L	221,000	6d	204,500	7d
Talagalla................ L	216,000	6⅝d	190,000	7½d
Thornfield............H	279,000	8½d	229,000	9⅝d
Tillyrie..................H	250,500	7½d	197,500	8¼d
Udaradella,.........HH	211,500	9¼d	191,000	8¼d

	1900 About lbs.	Av. price per lb.	1899 About lbs.	Av. price per lb
Ury....................... M	303,500	7d	198,000	7⅞d
Verelapatna...........H	220,000	8¼d	199,000	8¼d
Waharaka............. L	287,500	5¾d	186,500	7d
Warriagalla..... ......M	250,500	6¼d	184.500	7½d
Wereagalla............ L	237,000	5⅞d	193,500	6⅞d
Windsor Forest......H	219.500	7d	224.500	7⅝d
Wavelkelly............M	269,000	6½d	276,000	7½d
Yahalakelle...........L	287,000	6d	193,000	7⅛d
Ythanside........... H	216,000	7⅜d	231,500	8¼d

100,000 to 200,000 lbs.

	1900 About lbs.	Av. price per lb.	1899 About lbs.	Av. price per lb
Abbotsford.........HH	196,000	8⅞d	159,000	9¼d
Agrakande............H	148,000	7½d	132.000	8½d
Aigburth............HM	107,000	6¼d	97,000	7⅜d
Albion..................H	128,000	9d	106,000	9d
Alliawatte............M	128,500	6d	39,000	7⅜d
Allagalla............. M	131,500	7¼d	85,000	8d
Allerton............... M	103,500	5⅜d	56,000	6d
Aldie.................. H	197,500	9⅜d	175,500	9½d
Alton.................. H	139,000	8½d	115,000	9d
Alnwick...............H	113,000	8⅝d	119,000	8¾d
Amherst...............H	182,000	9⅝d	125,500	9½d
Ampittiakande......H	124,500	7¼d	123,500	7¾d
Ardross................ L	137,000	6⅛d	107,000	7⅛d
Arslena.............HM	113,500	6d	113,000	6¾d
Asgeria.................M	101,000	6¾d	76,500	7⅝d
Atherfield.. L	121,500	5⅞d	117,000	7d
Augusta Tea Est. Co.HM	146,000	6⅛d	100,000	7⅛d
Appachy Totam.....H	146,500	8⅜d	157.500	8¾d
Athlone ....M	112,000	6d	25,500	6¾d
Berat... ....H	118,000	8¼d	101,000	8⅝d
Bellwood...........HM	130,000	7d	100,500	7⅝d
Berragalla ....H	135.000	8⅜d	111,000	8¼d
Binoya..............HM	184,000	6½d	175,000	7⅜d
Blackburn ....M	118,500	6d	54,000	7d
Bogahawatte.........H	175,000	7½d	169,500	7⅞d
Brae..................HM	195,000	6¼d	175,000	7¼d
Bramley................H	106,000	8⅜d	80,000	9d
Brookside ...H & HH	117,000	10½d	104,500	10⅛d
Braemore... ....H	166,000	8½d	129,000	9½d
Bowlana...............M	107,000	6⅛d	101,500	7d
Beddegama.........HM	149,000	6¼d	150,500	7⅜d
Calsay ....H	175,000	8½d	154,500	8¼d
Caledonia.............H	142,000	8⅜d	123,000	8¼d
Carlabeck ....H	123,500	8½d	105,000	8¾d
Cattaratenne......HM	120,500	5⅞d	72,000	7¼d
Chrystlers Farm ....H	183,000	8¼d	164,000	8¾d
Clontarf................L	121,000	6d	98.000	7¼d
Condegalle............H	144,000	8⅝d	122,500	8¼d
Coolbawn ....M	123,500	6⅜d	94,000	7¼d
Cottaganga............H	172,000	6d	94,000	7½d
Cullen.. L	149,500	6¼d	121,500	7½d
Dalleagles.............M	185,500	6¼d	163,500	7⅜d
Dedugalla.............M	138,000	5⅞d	129,000	7¼d
Deeside ....H	176,000	7⅝d	139,500	8⅝d
Dehiowita ....M	152,500	6d	129,000	7d
Deltotte.............HM	176,000	6⅜d	140,000	7⅛d
Denegama ....H	133,500	5⅞d	109,000	7⅜d
Densworth.............L	182,500	5½d	150,000	6¾d
Derryclare........... H	125,500	8⅜d	107,000	8¾d
Dessford.............. H	173,000	8⅜d	177,500	9¼d
Detenagalla...........H	126,500	7¾d	102,500	8⅛d
Deyanella.......... HM	116,000	7d	106,500	7¾d
Dickoya............... H	111,500	6½d	134,500	7⅜d
Dimbulla............. H	158,500	8¾d	189,000	9⅜d
Diyanillakelle........H	119,000	10⅜d	128,000	10¼d
Ellawatte..............H	135,500	7⅛d	83,000	8¼d
Edinburgh............H	106,000	8¼d	74,000	8¼d
Eildon Hall...........H	159,500	8¾d	157,000	9¼d
Elfindale...............H	137,000	6d	143,500	7⅛d

	1900 About lbs.	Av. price per lb.	1899 About lbs.	Av. price per lb
Eltofts.....................H	166,500	8⅛d	158,500	8¾d
Emelina.................. H	120,500	7¼d	114,000	8⅛d
Excelsior..............HH	141,000	10¾d	155,000	9¾d
Etulgama..................M	142,000	6¼d	155,500	7½d
Ellamalle..............HH	163,000	6⅛d	105,000	7¾d
Faithlie................. H	185,500	7¾d	162,000	8¾d
Farm...................... M	166,000	6¾d	132,000	7⅞d
Fernlands.............. H	141,000	9¼d	135,000	9½d
Fetteresso............HH	168,500	7½d	129,000	8¾d
Forres.....................H	123,000	7¼d	118,000	8¼d
Galgawatte.............M	102,500	6¼d	92,000	7¼d
Galkandewatte...... H	166,000	8⅜d	161,500	7¾d
Gangwarily............M	139,500	6⅛d	103,000	6⅞d
Ganapolla.................L	100,000	5⅝d	77,500	7d
Gartmore.............. H	128,000	8¾d	158,000	8⅞d
Glenalla.................. L	113,000	5¾d	20,000	6¾d
Glencairn............... H	197,500	7⅛d	146,500	8d
Glenloch................ M	140,500	6¾d	135,500	7¾d
Goatfell...................H	115,000	1/1⅛	108,500	11⅝d
Gonamotava.......... H	121,000	9¼d	102,500	9⅞d
Goomera................ H	164,000	5¾d	133,500	7¼d
Gorthie...................H	166,500	7½d	121,500	8½d
Gonambil............HM	179,500	6⅛d	159,500	7d
Gowerakelle.......... M	121,500	8d	54,000	9⅛d
Gona Adika Coy.....M	153,500	6d	93,000	6⅝d
Happugahalande... M	180,500	5¾d	152,500	6⅞d
Hatherleigh............M	107,000	5½d	—	—
Hethersett............. H	186,500	8¾d	172,000	9d
Hindugalla............ M	147,000	7d	83,000	8⅜d
Holmwood............ H	147,500	10½d	128,000	10⅛d
Holyrood West.... H	177,000	9⅜d	191,500	9⅝d
Hopton............... HM	108,000	6½d	100,500	7⅜d
Hyndford................M	145,000	6⅞d	172,000	7¼d
Hunasgeria..........HM	185,500	5¾d	197,000	7¼d
Hopewell................M	116,000	6¾d	73,000	7⅜d
Halgolla................ L	141,500	6d	24,000	7¼d
Indurana..................L	166,500	6⅜d	126,500	7⅜d
Ingestre................ H	188,500	10d	193,000	9¾d
Kabragalla.............H	167,000	6½d	191,500	7¾d
Kaloogala.............. M	119,500	7⅜d	75,500	8d
Kalupahana............H	154,000	7½d	72,500	8¾d
Kelliewatte.............H	133,500	7⅞d	120,500	8¾d
Kelvin.................. M	112,500	6¾d	117,000	7⅜d
Kintyre................ H	115,000	7d	85,000	7¾d
Kirrimettia.............M	183,500	7d	181,500	7¾d
Kowlahena.............H	129,000	8⅜d	105,000	8⅝d
Kuda Oya.............H	193,000	6⅞d	187,000	7⅞d
Kenilworth..... ...HM	198,000	6¼d	163.500	7⅜d
Kew......................HH	173,500	7½d	133,000	8¼d
Logan.................... L	152,500	5⅞d	139,000	6⅞d
Lagalla................HM	136,000	5¾d	88,000	7¼d
Lauderdale..........HM	128,500	5¾d	157,500	6¾d
Leangapella...........H	108,000	6¼d	105,000	7¼d
Lynford ....H	145,000	8¼d	110,000	8¾d
Leangawella.......HM	133,500	8d	136,500	8¼d
MG..........................	140,000	5⅛d	28,000	7d
Macduff ....H	128,500	8d	114,000	8⅞d
Mahacoodugalla.....H	150,500	9½d	127,000	9¼d
Mahagalla ....H	142,900	7⅜d	100,500	8¼d
Maha Eliya ....H	124,500	7¾d	121,500	8⅛d
Mahagastotte ....H	121,500	9⅜d	102,500	9¾d
Maratenne ....H	128,500	7¼d	33,500	8d
Meria Cotta............H	170,000	9½d	115,000	9d
Midlands............HM	123,000	6⅜d	101,000	7⅜d
Minna......................H	199,000	7⅜d	55,000	8½d
Mipitiakande..........L	184,500	6d	140,500	7½d
Morar.......................H	163,000	7d	123,000	7⅝d
Moray.......................H	136,500	7½d	238,500	8d
Moolgama................M	115,500	6⅜d	85,500	7½d
Mount Pleasant...HM	133,000	6¾d	121,500	7¾d
Mudamana...............L	193,500	5⅞d	172,500	7d
Memorakande............	133,000	6⅜d	113,000	7⅜d
Nahalma...................L	178,500	5⅞d	145,500	6¾d
Narangala ....H	125,000	6⅛d	122,500	6¾d
New Forest ....H	122,000	7⅜d	104,500	8⅜d
Newton ....H	155,500	7½d	135,500	7⅞d
North Matale..........M	133,000	6½d	128,000	7d
North Pundaloya...H	110,500	6¾d	65,500	7⅝d
Nawalakande	142,000	6⅞d	92,000	7¾d
Oononagalla ....H	155,500	7¼d	31,500	7½d
Opalgalla.............HM	138,500	6½d	145,000	7¼d
Osborne....................H	141,500	8¾d	146,500	9d
Pedro ....HH	123,500	9d	121,500	9⅛d
Pansalatenne..........M	135,500	6½d	153,500	7¼d
Park ....HH	123,000	10⅝d	175,500	10⅝d
Pingarawe ....HM	140,500	7¼d	117,000	8¼d
Pita Ratmalie ....H	166,500	9d	162,500	8¼d
Portree......................H	175,500	7⅛d	132,000	7⅞d
Poyston.....................H	130,500	7⅛d	108,000	7⅞d
Pundaloya ....H	173.000	9⅛d	183,000	9½d
Poengalla.................M	145,500	6¼d	123,000	7¼d
Rasagalla..................M	136,000	6⅜d	66,000	7d
Rugby.......................M	156,500	7¼d	20,000	7¾d
Radella.. ....H	110,500	6⅞d	135,000	8⅛d
Rappahannock.......H	111,000	8⅝d	108,500	8⅜d
Ravenswood ....H	123,500	6⅞d	70,500	7¾d
Relugas ....HM	156,500	6½d	148,500	7¼d
Riverside.................M	147,500	6d	156,000	6¾d
Rickarton.............HM	150,500	7⅜d	130,500	8⅜d
Rillamulle ....H	110,500	7⅞d	81,500	7⅞d
Sirisanda...................L	111,500	5¾d	73,500	6¾d
Stinsford...................L	104,000	6¼d	95,000	6⅞d
St. Helens...............M	134,000	6⅛d	129,500	7⅛d
Sarnia.......................M	164,000	6⅞d	96,500	7¾d
Sembawatte ....HM	127,000	5⅜d	88,000	6¾d
Scarborough............H	117,000	7¾d	100,500	8¼d
Shawlands ....H	102,000	6⅛d	97,500	7¼d
Silver Kandy......HH	127,000	9⅛d	103,000	10d
Sinnapittia ....M	186,000	6⅜d	111,000	7⅝d
Somerset....................H	154,500	7⅝d	149,000	8⅛d
South Wanna Rajah H	110,500	7½d	119,000	8⅜d
Springwood.............M	174,000	6d	205,000	6¾d
Stellenberg...............H	102,000	7¼d	100,500	7¾d
Strathdon............HM	157,000	6⅞d	146,500	7¾d
Stockholm................H	193,500	6¾d	128,000	8⅜d
Savernake....................	165,500	6⅛d	144,000	7¼d
Sumtravalle ....H	133,500	9½d	117,000	9½d
Tebuana......................	102,500	5¾d	42,500	6¾d
Taurus.......................H	114,000	9½d	128,000	9⅜d
Theresia....................H	144,000	8⅞d	95,500	8¾d
Troy...........................L	154,500	5⅞d	138,000	7d
Troup ....H	136,500	9⅜d	160,500	8⅞d
Tunisgalla................H	116,000	5⅞d	24,000	7¼d
Tyspany ....H	190,500	7d	172,000	7½d
Tientsin ....H	144.000	8d	125,000	8⅝d
Ugieside....................M	158,500	5¾d	148,000	6¾d
Uva...........................H	184,000	6¼d	177,500	7⅛d
Uvakellie...................H	155,500	8⅜d	149,000	8¼d
Upper Haloya........M	186,500	6d	108,500	7d
Vathalana ....HM	106,500	6¼d	25,500	7d
Valamaly..................H	119,500	8¾d	129,500	8⅞d
Venture.....................H	195,000	7⅝d	166,500	8¼d
Verelupitiya.............L	145,000	6⅛d	112,500	7d
Waldemar.................H	172,000	8¾d	163,000	8½d
Wallaba ....H	192,500	7¾d	214,000	8¼d
Waltrim ....H	158,500	8⅛d	137,500	8⅜d
Wangie Oya.............H	171,000	6⅞d	—	—
Wattakelly................H	165,000	6⅝d	149,000	7½d
Wewelmadde,.........M	141,500	6⅜d	105,500	7½d
Wewesse.............HM	103,000	6⅞d	71,500	7¼d

	1900 About lbs.	Av. price per lb.	1899 About lbs.	Av. price per lb
Weyweltalawa.......M	155,000	6½d	41,500	7⅜d
Wigton...................H	132,000	6¾d	104,500	7⅝d
Wiharagalla..........H	163,500	8⅜d	78,500	9¼d
Wootton.................H	133,000	9⅛d	118,000	9⅝d
WFG.......................	126,000	5⅜d	82,000	6¼d
Yoxford...................H	129,000	9d	119,000	9½d

50,000 to 100,000 lbs.

	1900 About lbs.	Av. price per lb.	1899 About lbs.	Av. price per lb
Abergeldie.........HM	83,500	7d	80,500	7¾d
Ambawella............H	62,500	7d	68,000	8⅜d
Annfield..................H	91,000	9d	92,500	9¼d
Anchainkatte.........M	63,500	6⅜d	—	—
Avisawella L	95,000	6⅜d	261,000	6⅞d
Bathford..................H	85,000	7¾d	87,000	7⅞d
Batgodde..................H	82,000	8⅛d	56,000	9¼d
Berrawella ....M	92,000	6⅝d	113,500	7⅝d
Beaconsfield ....H	85,000	8¾d	53,000	8⅞d
Beverley..................L	85,500	7⅛d	77,000	8¼d
Blackwood...........H	92,500	7¼d	82,000	7¾d
Blair Avon............H	83,000	7d	72,000	7⅞d
Bon Accord ....H	78,500	7⅜d	69,500	7⅝d
Broad Oak.............H	86,000	6⅝d	98,500	7⅜d
Broughton.............H	88,500	8d	67,500	8⅛d
Burnswick.............H	81,000	7⅝d	70,000	8¼d
CH in diamond........	69,500	4¾d	—	—
Cairn-mon-earn...HM	94,500	6½d	86,500	7¼d
C'Galla....................M	83,500	7¼d	65,000	8d
Choisy ....H	78,000	7d	166,500	7½d
Clarendon ....H	59,000	7⅛d	82,500	7⅞d
Claverton ....M	72,000	7⅛d	66,500	8d
Craig ....M	74,000	9⅝d	75,000	9¾d
Damblagolla.......HM	73,500	6¼d	88,000	7¼d
Dangkande.........HM	95,500	6¾d	91,000	7½d
Deanstone.............H	77,000	8d	73,500	8⅞d
Delpotonoya..........H	73,500	6¾d	66,500	7¼d
Donside..............HM	95,500	6⅛d	90,000	7⅛d
DoombagastalawaHM	65,500	6⅛d	83,000	7⅝d
Dromoland........... M	58,000	5¾d	39,000	6⅞d
Dunnottar.............H	61,500	6⅞d	81,500	8d
Doonevale L	66,500	5⅝d	—	—
Eila.........................L	67,000	5½d	—	—
Elemane............ ..H	66,000	6⅝d	45,000	8¼d
Ellagalla.................M	95,000	6¾d	111,000	7¼d
Ettie.........................L	58,500	5⅝d	51,000	6¼d
Fairfield.................H	96,500	8¼d	109,500	8⅝d
Fassifern ....H	61,500	8¼d	72,500	8⅝d
Fruit Hill...............H	76,000	7⅜d	86,500	7¾d
Ferham ....H	89,500	9⅝d	87,000	9⅝d
Gallaheria ....H	86,500	7d	96,000	7½d
Gavatenne ....HM	66,000	8¼d	57,000	8⅞d
Glenorchy..............H	82,500	8¼d	54,000	8½d
Glentaaffe.............H	74,500	7¾d	88,500	9¼d
Gallata ....HM	96,000	6¼d	81,500	7¼d
Getena......................	51,500	5⅞d	—	—
Hakurugalla L	62,500	5⅞d	48,000	6¾d
Hallowellah ....H	70,000	6¾d	67,500	7¾d
Heatherton.........HM	81,500	6¾d	72,000	7½d
Holbrook................H	65,500	9d	—	—
Hunugalla ....H	71,500	6d	169,500	7½d
Harmony.................M	64,500	6d	63,500	7d
Ivies.........................L	87,500	5¾d	89,000	6¾d
Ingurugalla ....M	65,500	6d	75,500	7d
Kaipoogalla...........H	98,500	7½d	91,500	8⅜d
Kallebokka ....M	99,500	6½d	118,000	7½d
Keenagaha Ella...HM	55,000	6⅜d	59,000	7d
Koladenia..............M	57,000	6d	37,500	6¼d
Kottagalla.............H	68,500	7⅞d	81,000	8⅛d
Lamiliere...............H	96,500	7⅜d	62,000	7¾d
Lauriston ....HH	55,000	8⅜d	45,000	9⅛d
Loinorn...................H	88,000	9½d	100,000	9¾d
Lover's Leap......HH	62,000	9⅛d	89,000	9½d
Lawerencewatte.....M	96,500	6d	84,000	6⅝d
Logie......................H	76,000	7⅞d	107,500	7¾d
Maddegadera.........L	82,000	5⅝d	104,000	6⅞d
Marakona..............M	79,000	5⅝d	50,000	6½d
Mandara Newera....H	51,000	7⅜d	47,500	8¼d
Maymolly ....H	80,500	7¼d	93,500	8⅛d
Melton ....H	69,000	7⅜d	49,000	8d
Midlothian ....H	73,500	7½d	60,500	7⅞d
Mincing Lane.........H	80,000	7¼d	70,500	7⅝d
Mayfield.................H	51,000	7¾d	251,000	8⅛d
Mottingham ....H	95,000	7d	92,000	7⅝d
Moralioya..............L	98,500	5¾d	73,500	6¾d
Myraganga	71,500	6½	102,000	6½d
Meddetenne ....M	86,000	6⅛d	40,000	6⅝d
Mousa Eliya..........H	87,500	6¼d	31,000	7d
Meddakande ....M	97,500	6⅜d	36,000	7¼d
Napier....................M	87,500	7½d	39,000	8½d
North Cove...........H	89,500	9½d	99,500	9⅜d
Norton ....HM	89,000	6⅝d	73,500	7d
Nutbourne............H	69,000	8½d	50,000	9d
Nahaveena.........HM	61,000	6d	63,000	7⅛d
Oolapane................M	55,000	6⅜d	88,500	7¼d
Orwell ....M	58,500	6d	88,000	7¼d
Ormidale................H	95,500	9⅞d	75,500	10¼d
Pati Rajah............M	68,500	6⅛d	32,000	7⅛d
Peacock Hill.......HM	77,000	6¾d	89,000	7¼d
Poolbank...............H	68,500	7¾d	53,500	8⅜d
Portswood..........HH	94,500	9⅝d	148,000	9¾d
Rajawattie.................	76,500	6⅜d	—	—
Rahanwatte...........H	79,500	7¾d	96,500	8¼d
Raxawa...................M	78,500	6½d	181,000	7¼d
Ridgmount	51,500	5⅝d	62,000	7⅛d
Ritnageria............H	83,000	9d	75,000	9¾d
Rookwood ....H	79,000	6¾d	193,500	7½d
Robgill ....H	76,500	8¼d	54,500	8½d
Rookatenne...........M	92,500	7⅞d	42,000	8¼d
Stonyhurst.........HM	64,500	6⅞d	50,500	7¾d
St.Andrew's(Dimb)H	64,000	8½d	92,500	8¼d
St. Leys.................H	66,000	7d	44,000	8d
St. Margarets.........H	68,000	8⅝d	69,500	8⅜d
St. Vigean's............H	83,500	7½d	49,500	8⅜d
Stubton..................M	55,500	5⅞d	37,500	6¾d
Shannon............HM	84,500	6¾d	54,500	7⅛d
Sutton....................H	78,500	11¾d	142,000	9½d
Summerville ....H	87,500	7d	61,500	7¾d
Thotulagalla ....H	99,000	9¼d	78,500	8½d
Udaveria.................H	50,000	7½d	51,500	9d
Udabage L	89,500	6d	81,000	7d
Uma Oya................M	64,000	7⅜d	51,500	8⅛d
Vicarton............HM	65,500	6¼d	60,500	7d
Wavena	53,500	6¼d	—	—
Warleigh............HM	65,000	7⅝d	62,000	8½d
Warriapola............M	71,000	6¼d	29,000	7½d
Wattawella...........M	82,000	7½d	56,500	8d
West Haputale......M	89,000	8d	77,000	8⅜d
Wewebedde...........H	56,500	7½d	60,000	7⅞d
Wevekellie............M	62,000	7¼d	64,000	8½d
Wellington............H	62,000	8⅜d	49,000	8¾d
Weddemulle ....H	85,500	7d	49,000	8¼d
Weygalle............HM	67,500	5⅛d	54,500	7⅛d
Walhandua	77,000	6⅛d	33,500	6¾d
Weymouth.............L	87,500	6¼d	23,500	6¾d
Yapame...................H	75,000	6⅝d	—	—
Yuillefield ....H	91,000	7⅜d	81,000	8½d

20,000 to 50,000 lbs.

	1900 About lbs.	Av. price per lb.	1899 About lbs.	Av. price per lb
Agarsland..............M	32,500	6½d	52,000	7½d
Ankanda.................M	40,500	6¼d	51,500	7⅛d
Ardlaw & Wishford H	28,000	8d	67,500	7¾d
Avoca ....H	24,000	8¼d	38,000	8⅞d

	1900 About lbs.	Av. price per lb.	1899 About lbs.	Av. price per lb
Atherton ....M	20,500	6⅜d	33,500	7d
Beauvais ....H	27,000	7⅜d	20,500	8¼d
Bargany ....H	21,500	6¾d	—	—
Bunyan ....H	45,000	7¼d	84,000	8d
Blairgowne ....H	49,500	5⅞d	—	—
Callander ....H	23,000	7¼d	30,500	7¾d
Chetnole L	37,000	6⅝d	40,000	7d
Coodagalla ....M	36,500	5¾d	27,000	6⅞d
Craigie Lea ....H	25,000	7⅝d	272,500	8⅛d
Eadella	22,500	5¾d	28,500	6¾d
Eastlands ....H	40,500	7¼d	36,500	7¾d
Gantanne ....M	24,000	6d	21,000	7d
Geddes ....H	23,500	6⅞d	23,000	8⅝d
Gingran Oya ......HM	43,500	6¾d	38,500	8½d
Glentilt ....H	39,000	8d	—	—
Hiralouvah ....H	25,500	6⅛d	—	—
Hornsey Est. Co. ....H	27,500	10d	—	—
Hapugastenne ....H	47,000	6d	—	—
Inicawatte ....M	25,500	4⅜d	27,000	6⅛d
Indian Walk L	46,000	5½d	57,500	7d
JMK ....HM	26,500	4¾d	31,000	6¼d
Kalugalla ....HM	44,000	5¾d	51,000	6¾d

	1900 About lbs.	Av. price per lb,	1899 About lbs.	Av. price per lb
Kahawatte ....HH	83,000	7⅛d	175,500	7⅝d
Kalugama ....H	44,000	8⅝d	57,000	8⅝d
Lynsted ....H	48,000	8d	85,000	8⅜d
Lonach ....HM	32,000	6d	140,000	7¼d
Ladbroke... ....HM	32,500	6¾d	—	—
Manickwatte ....H	24,500	6⅜d	20,500	7⅜d
Nella Oola ....M	35,000	5⅞d	47,000	6¾d
Obiya ....H	45,000	7¼d	25,500	8⅝d
Old Haloya ....M	40,500	5¾d	29,500	7d
Ovoca ....H	42,500	7⅝d	91,500	8¼d
Puspone	32.500	5½d	26,000	7½d
Panmure ....H	46,500	7⅜d	71,500	8d
Polgahakanda L	39,500	6¼d	108,000	6⅞d
Poondappa ....HM	39,500	6d	33,000	6¾d
Rajawella L	29.000	6d	28,500	6¾d
Rahatungoda ....H	20,500	7½d	96,500	7¾d
Richlands ....HM	23,500	6¼d	30,500	8¼d
Stisted L	45,500	6⅝d	—	—
Taprobana ....H	77,500	6⅜d	89,000	7⅛d
V.O.A ....H	39,500	5½d	51,500	7⅜d
Warwick ....H	40.500	7½d	56,000	8¼d
Westward Ho......HH	48,000	7½d	46,500	8d

7,000,000 lbs. averaging 5.80d per lb. sold on purchase account are not included in the above returns.

Estimated relative Yield and Average Price realised for the different Ceylon Tea Districts, compiled from the Public Auctions held in London between January 1st and December 31st, 1900 :—

	1900. lbs. about	Av. Price per lb. about 1900.	1899. lbs. about	Av. Price per lb. about 1899.
Nuwara Eliya, Maturata & Uda Pussellawa	4,500,000	9.10	4,000,000	9.25
Dimbula	18,250,000	8.75	17,000,000	9
Dikoya	6,000,000	8	6,000,000	8.50
Bogawantalawa	4,500,000	7.90	3,000,000	8.60
Haputale	3,250,000	7.90	2,500,000	8.50
Maskeliya	4,000,000	7.45	3,500,000	8.40
Pussellawa, Kotmale, Pundaloya and Ramboda......	8,500,000	7	8,000,000	7.60
Uva	6,750,000	6.90	5,000,000	7.10
Hewaheta	2,500,000	6.90	2,000,000	7.60
Kelani Valley and Kegalle	10,000,000	6.10	8,000,000	7
Ambegamuwa and Lower Dikoya	3,500,000	6.60	3,000,000	7.50
Sabaragamuwa	1,750,000	6.55	2,000,000	7.50
Nilambe and Hantane	4.000,000	6.50	3.500,000	7.50
Kadugannawa and Alagala	2,500,000	6.40	2,000,000	7.40
Matale and Hunasgeriya	5,750,000	6.35	5,000,000	7.40
Knuckles, Kellebokka, Rangala	4,750,000	6.35	4,000,000	7.25
Kalutara	3,000,000	6.25	3,000.000	7.40
Dolosbage and Yakdessa	6,000,000	6.20	5,500,000	7.25

Prussic Acid in Sweet Cassava.

By Professor Carmody, F.I.C., F.C.S.

(Revised Reprint from *The Lancet* of Sept. 1900.)

Francis, one of my predecessors in the Trinidad Government Laboratory, was the first* to point out that prussic acid was present in sweet cassava to a considerable extent. Francis's results have not received the attention which they deserved, probably because they were a direct but unconfirmed denial of statements repeatedly made by recognised authorities. There are very few recent editions of toxicological handbooks that make any reference to the results published by Francis. Even in standard reference works like that of Dr. Thorpe's "Dictionary of Applied Chemistry" it is stated that "the milky juice in the sweet variety is innocuous, whilst that in the bitter is highly poisonous."

The question is of importance from a toxicological point of view in those places in the tropics where cassava is used extensively as a food. For poisonous symptoms are not infrequently reported after a meal of sweet cassava; and as the two kinds of cassava—the sweet and the bitter—are so much alike as to be almost indistinguishable, the conclusion usually arrived at is that the bitter variety has been cooked in error.

My results fully confirm those of Francis as to the presence of hydrocyanic acid, although his average figures are somewhat higher than mine. This year has been an unusually dry one for Trinidad and a diminished supply of rain does affect the character of plant juices.

The method of analysis adopted by me differs somewhat from that of Francis. He grated 500

* Analyst, April 1877.

grammes of cassava into 500 cubic centimetres of water which was left for two hours in a well-closed vessel. It was next strained through a linen cloth into a flask which was then corked and allowed to stand until the starch subsided. 200 cubic centimetres of the clear liquid were decanted and distilled and the results obtained were multiplied by four for the total in 500 grammes. This calculation was based on the assumption that the original 500 grammes contributed 300 cubic centimetres of water —an assumption which is not far from the truth if the cassava is quite fresh. Francis also remarks that a slight loss occurred during the process of grating, and in a tropical laboratory this loss might be appreciable. I endeavoured to avoid this loss on the one hand, and the possibility of error through assuming that all cassavas contained 60 per cent. of water on the other, by taking the whole root, slicing it quickly, and allowing it to stand in water all night in a well-corked flask. The liquid was decanted in the morning and the whole distilled. The extraction with water was repeated a second and a third time. The slices effectually prevented the great disadvantage arising from the starch finding its way into the distilling flask, which Francis prevented by subsidence but which necessitated his distilling an aliquot part, this aliquot part being a *definite* volume of 200 cubic centimetres taken from an *approximate* total volume of 800 cubic centimetres.

Francis does not appear to have made more than one extraction with water. I have made three in all cases and in some as many as five. I have found that with slices the second extraction yields as much, and sometimes more, than the first. I have repeated Francis's method of grating and find that a second extraction yields about half as much prussic acid as the first. It would appear from this, therefore, that Francis's results are not as high as they would have been had he made a second extraction. The figures obtained by Francis and myself are:—

	HCN per cent.	
	Francis.	Carmody.
Mean	0·0168 ...	0·010
Highest	0·0238 ...	0·019
Lowest	0·0113 ...	0·005

It will be seen from this that while my "lowest" percentage is much below that of Francis my "highest" is nearly the same as his. This establishes the truth of the statement made by Francis, "that the so-called *sweet* or harmless cassava not only yielded prussic acid, but the quantity obtained from it so nearly equalled that from the *bitter* that no line of distinction could be drawn between them," so far as it relates to the amount of prussic acid in the cassava; but I have discovered an analytical difference between the two kinds by means of which they can be satisfactorily distinguished.

This discovery arose in trying to avoid the difficulties caused by the presence of starch in the distilling flask At first I placed the slices in the distilling flask, added water in one set of experiments, and passed steam through in another and collected the distillates. This failed in each case through the gelatinising action of the boiling water or steam on the starch. This starch being chiefly confined to the inner protions, in my next experiments I soaked the inner slices in water at ordinary temperature, decanted and distilled. The quantity of starch thus admitted into the flask was so small as not to interfere with the distillation. The skin and outer cortical layer, which together constitute about one-fifth of the total weight of the sweet cassava, could be placed direct in the distilling flask, and the distillation carried on satisfactorily. It was this separation of the parts for convenience in distillation that led to the discovery that in sweet cassava the prussic acid is located chiefly in the skin and outer cortical layer.

The following are some of the results obtained from fairly representative samples of sweet cassava.

Inner part. HCN per cent	Skin and outer cortical layer. HCN per cent.	Inner part. HCN per cent.	Skin and outer cortical layer. HCN per cent.
0·006	0·033	0·004	0·024
0·003	0·014	0·010	0·030
0·015	0·033	0·004	0·042
0·008	0·031	0·005	0·038
0·011	0·020	0·003	0·034
0 008	0·032		

With bitter cassava the following results were obtained from representative samples:—

Inner part. HCN per cent.	Skin and outer cortical layer. HCN per cent.	Inner part. HCN per cent.	Skin and outer cortical layer. HCN per cent
0·031	0·024	0 017	0·019
0 034	0·012*	0·019	0·020
0·021	0·025	0·016	0·024
0·037	0·014*	0·017	0 020
0·030	0·025	0·013	0·016
0·014	0 013	0·032	0·035

*Exceptional.

The general conclusions to be drawn from these results are: (1) that in sweet cassava the prussic acid is not uniformly distributed throughout the tuber and that in bitter cassava it is uniformly distributed, or nearly so; and (2) that this affords an analytical means of distinguishing between *sweet* and *bitter* cassava.

Cassava is cooked either by roasting the entire tuber (this removes all the HCN) or by boiling. An important observation in connection with local methods of eating cassava is that the skin of the sweet kind is removed before boiling, the inner portion alone being cooked and eaten. This custom is no doubt the result of experience and accords with what science would now teach as a wise precaution. But, notwithstanding this removal of the skin, ill-effects are said to follow from the use of the inner portion if water is drunk some time after a meal. This may now be accounted for in this way. It is shown in my experimeuts that whilst a first boiling removes a certain amount of hydrocyanic acid—all, in fact, that exists ready formed in the tuber—that a second addition of water and subsequent boiling removes a further portion. It would appear from this that cassava in a person's stomach would also develop an amount of prussic acid equivalent to that obtained in a second distillation, and that the drinking of water would dissolve this and cause it to act more readily on the system. The total quantity would, however, be far below the minimum fatal dose and would only be expected to produce those unpleasant results occasionally reported. The question next arises—Is this second portion of hydrocyanic acid produced by fermentative changes, as is known to happen in the case of bitter almonds; or is it part of that originally existing in the tuber and in some way protected from the solvent action of the first treatment with water? It is possible that, with slices, the water would penetrate slowly to their interior, and thus produce a second yield of prussic

acid; and that if the cassava had been grated, as was done by Francis, the water would, within Francis's limit, dissolve the whole of the acid. I have not found this to be the case, as the following experiment shows:—

Sweet Cassava.

Duration.	Half (408 grammes) sliced n/10 $AgNO_3$.	Half (427 grammes) grated n/10 $AgNO_3$.
First extract 2 hours	3·0 c.c.	2·2 c.c.
Second " 2 "	1.3 "	1·4 "
Third " 20 "	3·5 "	1·4 "
Fourth " 2 "	1·0 "	0·7 "
Fifth " 2 "	1·0 "	0·9 "
Sixth " 17 "	1·1 "	0·5 "
Seventh " 2 "	0·4 "	0·7 "
Eighth " 2 "	0·5 "	0·9 "
Ninth " 2 "	0·2 "	1·3 "
Total ...	12·0 c.c.	10 0 c.c.

It would appear from this and similar experiments that the whole of the hydrocyanic acid cannot be removed from grated cassava by a two hours' extraction with water, and that there is apparently a loss of acid even when the grating is done under water. And, notwithstanding that my yield from slices is the higher of the two, Francis's results from a two hours' extraction are appreciably above mine. As already stated, this may be due to the exceptionally dry season. Next year I shall continue the experiments in order to clear up this difficulty. At present I am inclined to believe that part of the acid may be formed by fermentative change. If this be so, cassava starch on keeping would be likely to be more poisonous than when freshly prepared. Fermentation beyond a certain limit entirely decomposes the hydrocyanic acid.

There appear to be no grounds for the common belief that sweet cassava contains more HCN the older it is. In all the samples examined during a period of nine months from the time cassava was first brought to market the proportion of HCN showed no increase that could be traced to age. Nor is there any ground for the belief that the locally grown sweet cassava is but a degenerate growth resulting from many years' association with the bitter variety. A selected sample imported from Jamaica and grown at the local Government gardens contained the same amount, and the same relative proportions in skin and inner part, of HCN as the ordinary product of Trinidad.

The subject is not yet exhausted, and I hope to be in a position to publish further results next year.

SISAL HEMP IN CUBA.

(*Specially translated for "Indian Gardening and Planting."*)

We are indebted to M. J. Vilbouchevitch of Paris for a copy of a most interesting report by M Léon Hautefeuille upon his mission to Cuba on behalf the Cayo-Cruz and Cayo-Romano Company to inspect their lands under Sisal Hemp in those parts. From the report we gather that the Company has leased its lands to the Paris firm of Bridat-Mont'Ros et Cie. for a period of two years, renewable by mutual consent for the same period. The necessary capital has been supplied by the Maison Bridat-Mont 'Ros, the net profit to be shared between the firm and the Company. The local management is confided to M. Mahiquez. The enterprise has only just (1900) reached the productive stage. It is now in full bearing, but was at the commencement of last year handicapped by insufficient supply of bullocks for traction and to work the decorticator. Twenty-eight pairs of bullocks have now been sent from Havana, and this want is therefore well supplied. The following is a translation of M. Hautefeuille's report of the actual state of the plantation :—

"An inspection of the *henequen* plants produced upon me a most happy impression. They were superb in size, vigour and health. Nothing is more satisfactory to one who has an agricultural taste, than the sight of a cultivation well suited to the soil and in conditions in which it finds itself well placed. The lands occupied by the *henequen* are incontestibly of a poor nature. No one would seriously think of planting there any rich cultures, and yet here is the fact that a plant, formerly wild, brought here, flourishes, develops marvellously and furnishes in abundance an industrial product in good demand, of which the sale is indefinitely assured at a good price.

"*Henequen* fibre is in fact very much in demand for the manufacture of strodg fabrics, and above all for ropes employed on shipboard, by reason of its lightness, strength and resistance to rot.

"*Henequen* is an Agave (*Agave Mexicana Agave sisalana*), which was long considered a plant without value, very common in the Bahamas in Yucatan and other parts of Mexico, where one variety is utilised for the manufacture of a fermented drink called *pulque*. The fibre having been found utilisable, experiments were made in Mexico, after which importance plantations were made as soon as a machine allowing of the fibre being economically obtained was devised. Yucatan in particular undertook the production of *henequen* ; subsequently the lands, till then uncultivated, in the Bahamas furnished a superior variety. Cultivation modifies the characters of the plant a little, of which it develops the size ; but it is the nature of the soil which has the greatest influence on the value of the fibre obtained.

"The old administrators of Cayo-Romano (the Spaniards) attempted to turn to account this novel cultivation. They made experiments in all the soils of the Cayos. The plant grew irregularly ; very badly in the gravels of Cayo Cruz, which were besides too humid ; better at Cayo-Romano, in the low dry soils; less well on the heights not on account of the soil, but because of the altitude ; in an inadequate manner in the lands, although of better quality, of the northern slope.

"*Henequen* requires a poor dry, rocky soil ; it loves the pockets of soil formed between rocks to which it seems to cling. It needs plenty of heat and the rocks store up and emit heat. Hence there arise very appreciable differences of quality. The finest specimens producing the best fibre are

found in dry and stony soil. As in France the best vineyards are sometimes found in soils of poor appearance."

There is a complete demonstration of the preferences of *henequen* at Cayo-Romano. A walk of a few hours suffices to take account of these preferences. One can henceforward plant almost to a certainty.

"The actual plantation (Cayo-Romano) occupies about 600 hectares (1,482 acres, 1 hectare = 2·47 acres) I could not say how far it may be extended. It would have taken me five or six days to indicate and limit the size of possible extensions. I do not doubt, however, that 3,000 hectares (7,400 acres) of land suitable for *henequen* could be found by clearing certain wooded parts, and I do not say that it would not be possible to push the cultivation up to five or six thousand hectares or more, by utilising, in course of time, the distant lands of Versalles.

"It would be premature to attempt an account of the receipts and expenses of *henequen.* The price is not definitely fixed, and we believe it is destined to rise on account of the quality of our fibre, recognised in commerce as superior to that of Yucatan. The fibre of Cayo-Romano is whiter, finer, of greater resistance and longer. These qualities have a very appreciable influence on the price.

"The machine installed at Port-Versalles decorticates on an average 50,000 leaves per day, furnishing about 2,000 kilogrammes (4,400lb) of fibre, or 13 balls of 150 to 160 kilos each. The fibre is sold at the rate of nearly 1 franc the kilo. But the machine does not work at present at its full power. If it were regularly fed so as to work without intermission 10 hours per day it could turn out 4,000 kilos of fibre which represent 100,000 leaves, or the yield of 1 hectare 78 ares 5 centiares (4 2-5th acres).

"A hectare contains 2,000 plants placed at two metres distance in all directions with a path line between at least every five rows. Each plant should give on an average 28 leaves, or at the rate of 40 grammes per leaf, 1,120 grammes of fibre per plant, or 2,240 kilos (4 928lb) of fibre per hectare and by the year 56,000 leaves.

"Mr. Galan, the Sub-Director of the Plantation, estimates that 1,000 leaves of *henequen* may give 40 to 45 kilos of fibre; but he generally calculates on 40 kilos. M. Mahiquez indicates figures nearly the same. He goes as far as 45 kilos per 1,000 leaves."

M Léon Hautefeuille further on in his report remarks that as he was not representing the proprietary society, but only the house which had rented the plantation, he was not in a position to ask for accounts. Therefore his remarks on working expenses must necessarily be imperfect. Still, certain of the expenses are known and he proceeds to give them as follows :—

"100 men are employed daily in the actual cultivation for the service of the machine and these cost altogether 150 piastres (750 francs) for 2,000 kilos of fibre,

"It would need 200 men costing 250 piastres (1,250 frans) to furnish 4,000 kilos, of fibre. Cutting 1,000 leaves of *henequen,* putting up in bundles and placing in carts come to 6 francs 25 c. and then transport to the factory to 2 francs 50 c.

"So that 2,000 kilos of fibre require a daily expenditure of 1,187 francs 50 c and 4,000 kilos an expenditure of 2125 francs, but the produce goes backwards and forwards. The grain falls through, not of course absolutely clean, there must still be small particles of *bhusa* and chaff, but it is clean enough to store conveniently and the small particles are quickly got rid of when we have a wind. If a winnower in the place of a thermantidote can be built, it of course expedites matters greatly. I find it a good plan to erect a long grass hut at one end of the threshing floor to store the partially cleaned grain in as a protection against rain and also thieving.

ARTHUR L. HARMAN.

PLANTING NOTES.

POMEGRANATES.—The pomegranate fruits freely in Queensland, but no use is made of the fruit. The *Florida Agriculturist* points out that a good market for this fruit exists in New York. It is a highly popular fruit among certain classes, and is worth from 5 to 6 dollars (£1 to £1 5s.) per crate. The demand is yearly increasing—the more it is known, the more popular it becomes. Enough cannot be procured to supply the market. The *Agriculturist* does not state how many fruits are contained in a crate. Still, here may be another opportunity for Queensland orchardists.—*Queensland Agricultural Journal.*

BANANAS.—Humus, Drainage, Tillage, these three are the banana plants requirements, and without the first it is hopeless to expect bananas to grow and produce fruit; with the first, but without the second, they might grow, but would not do very well except in seasons of light rains; with the two first and not the third, bananas have been grown for many years in succession on rich alluvia and loams, and fine bunches produced, and are being grown still, but with Tillage better results would have been obtained in the end, for many of such lands have now been thrown up as worn out, which with cultivation all along, would have been bearing well as ever; and they can be restored with Tillage only, to almost their pristine strength. But the greatest of these is Humus.—*Journal of the Jamaica Agricultural Society.*

PURE KEROSENE FOR SAN JOSE SCALE.—Further reports are to hand as to the effectiveness of pure kerosene, applied carefully with a brush, in destroying San Jose scale on deciduous fruit trees. In a letter to the fruit expert, Mr. F. Mason, of Beecroft, says: "I wish to tell you that I painted, on August 23 last eighteen Carrington Apple trees with pure Kerosene, and also four Nelson apple trees, on September 17, that were all badly affected with this terrible San Jose scale. The trees are now looking well, and there is not a scale to be seen on any of them. I have a number of Carrington apple trees that have not been so treated for the pest, and they are very badly affected. Some of the trees are suffering badly, and the fruit is literally dotted all over with the young scales. I shall be pleased if you can kindly tell me what to do with these." When the scales attack fruit it is difficult to devise any economical method of destroying them. With a pest like San Jose scale the only really effectual means of destruction is to attack the scales in winter while the trees are bare of leaves, and after pruning. All prunings should be carefully collected and burnt, and the tree either treated with pure kerosene or fumigated with hydrocyanic acid gas. The kerosene method is, however, so simple and efficacious that unless one has extended use for a fumigating outfit for the destruction of scale in citrus trees, it is scarcely worth while going to further expense in procuring one.—*Agricultural Gazette of New South Wales.*

TEA IN PEERMAD, TRAVANCORE: GREEN TEA MANUFACTURE AND RESULTS.

Mr. Drummond Deane has always some practical suggestion to make, as well as useful information to give, when he puts his pen to paper. Under date of 24th March, he writes of his Peermaad district (elevation 3,600 feet):—

Places here in bearing average well over 450 lb per acre and some up to 600 lb per acre and I take it the average cost *f.o.b.* does not exceed 20 cents in this district and they are good highgrown teas. If you turn up Peermaad teas sold in Colombo some ten years ago you will find very fair averages, comparing with Ceylon, for Kuduwa Karuam, Bon Ami, Penshurst, Mount Glenmary.

"I wonder when we shall begin to hear result of sales of green teas in America; why do not we see the prices quoted for teas like Brunswick, Moray, Darrawella, etc? If they are fairly good it would stimulate the manufacture and they cannot be very bad or those estates would not continue making. I think the '30 Committee' should when paying the bounty on green tea insist on having *copies of all sales* sent them."

We commend the closing hint to the consideration of the "Thirty Committee."

JAVA CINCHONA BARK.

Cinchona planters in Java have thrown off the yoke of a German ring of dealers, who had combined to keep the price of bark down for the enrichment of quinine manufacturers. They have started a quinine factory of their own at Bandong in Java, and arranged to sell their quinine at Batavia by auction. The German monopolists have threatened to start a rival quinine factory in Java. A German quinine manufacturing firm intends to carry the war into the enemy's country in a different way. It proposes to sell quinine pills in Java,—that is, quinine prepared for direct consumption,—at a price corresponding with that of Bandong quinine at the Batavia auctions. The firm will certainly suffer loss by this, but the Bandong factory will have also to stop the making of quinine pills, and will thus lose a main source of profit.—*Straits Times*, March 19.

WESTRALIAN ROYALTY ON GUANO.

The Minister for Lands recently received an application from Messrs. Broadhurst, M'Neil, and Co., who are associated with the guano trade, asking that the Government should remove the royalty on guano exported to the eastern States to the extent of 10s per ton on live and 8s. 6d. per ton on dead. They maintain that, now that the States are federated, the embargo should be abolished The Government was asked to consider the application, and the decision that was arrived at was that, as the amounts levied were not regarded in the light of an export tax, but simply a royalty for the removal of certain matter from Crown lands, it was not possible to accede to their request. —*P. M. Herald*, March 15.

THE CHAIRMAN OF THE INDIAN TEA ASSOCIATION ON THE PROPOSED TEA CESS.

(*To the Editor of "Planting Opinion."*)

DEAR SIR,—I notice that in your issue of 9th March you perpetuated an error made in reporting by a Calcutta Daily paper; and in doing so you not only put into Mr. Topping's mouth what I said, but you make me out an opponent in conjunction with Sir Patrick Playfair of the proposed tea cess. Instead of "Mr. H S Ashton and Sir Patrick Playfair have spoken," you should read "Mr. H S Ashton said Sir Patrick Playfair has spoken" and so on.

Inasmuch as I have, just been elected Chairman of the I T A, it is perhaps advisable that it should be clearly understood that I strongly approve of the proposed cess. The proposal has been made as an alternative to the present method of obtaining voluntary subscriptions for advertising purposes, which for seven years has resulted in an annual collection of about a lakh. In 1893 this sum might be considered respectable, but I think I am justified in saying that the failure to increase subscriptions as the output of tea has increased damns the voluntary system as inefficient, and justifies a resort to other methods if new markets are to be thoroughly exploited by Indian tea. Of course there are proprietors who deny the value of advertisement by other than private enterprise, and their influence may be sufficient to block the way, but it is also quite certain that there are a number who are willing to share the cost of exploiting new markets, and who do not now subscribe, if provision is made to protect them against subscribing more than their shares. The cess will meet their views, whilst I think it must be pretty obvious that those who have for years been doing more than their share will get tired of the present system, because, if for no other reason, "it is so difficult to tax and please" and there is just as little pleasure in the process whether you impose the tax yourself or not.

There appears to be another body of people interested who approve of all the exploiting that can be done, and who suggest far more expensive schemes than any yet attempted. At the same time they deprecate the intervention of Government, who, they seem to fear, would keep the tax on when the object for which it was imposed ceased to exist or, in other words, would divert, at some time or other, to their own uses, funds specially here marked. In view of the proved efficacy of the Ceylon system and in view of the practical failure of the Indian voluntary system, I would ask such people whether it is worth while opposing the tax because they hold the theory that the Government of India is shameless, for that is what their argument amounts to. Sir Patrick Playfair's suggestion is to distribute over 5 million lb. of tea (3 per cent of the crop) this year in India, and he thinks the cost of administration may be covered by sales, but not any part of the value of the tea. I thoroughly approve of something of the kind being done, but after seven years' experience on the I.T.A. Committee, during which the difficulty of obtaining money has been in constant evidence, and the crippling effects upon all operations of the uncertainty as to funds voluntarily

subscribed, I would rather see the Committee, which will shortly be formed to exploit India, commence operations with a solid fund behind it such as the proposed cess would bring in. The industry has never risen beyond a lakh a year by voluntary effort. If you value the 5 million lb of tea above referred to (the cost of which it is thought will not be recovered) at -/1/- a lb, it will cost the industry over 3 lakhs, at -/2/- over 6 lakhs and it is at least fair to infer that it will be difficult to get such a subscription responded to after past experience. The Committee having to find ways and means will undoubtedly be greatly handicapped and any scheme they may decide to adopt will consequently be delayed to the detriment of practical work.

To those who believe in advertisement and yet hesitate to support the cess, I suggest the above points. H. S. ASHTON.

PLANTING AND LIFE IN DOMINICA.

[We feel indebted to the gentleman who sends us the following correspondence for publication. Transferred to our *Tropical Agriculturist*, it will aways be available and useful for reference. —ED. *T.A.*]

Government House, Dominica, 31st Dec., 1900.

DEAR SIR,—I must apologise for my delay in answering your letter of 16th October last.

I have much pleasure in forwarding you herewith a series of answers to a number of questions that have been addressed to me by various correspondents on the subject of planting in Dominica. I hope these notes will give you some of the information that you require.

I may add that, as the distances are not long in Dominica, Crown land can be purchased for 10s an acre, payable by instalment. There are one or two partly developed estates for sale, but a large price is being asked. Several Englishmen have come out during the last few weeks, and are taking up Crown land. The first comers will naturally get the pick of the land that is being opened up by the new roads.

Dominica has never suffered very severely from a hurricane, and the effects of a West Indian storm are frequently exaggerated for various reasons.

Mr. Gordon Fowler, an ex-Ceylon planter, who started a coffee estate here about three years ago, is so satisfied with his results that he has increased his holding, during the last year, from 300 to 1,100 acres. His coffee is magnificent, and there is a complete absence of blight,—I remain, dear sir, yours faithfully,

H HESKETH BELL, Administrator.

W. Hardy, Esq., Gillardstown, Wattegama, Ceylon.

NOTES ON DOMINICA FOR INTENDING PLANTERS.

1. BEST ROUTE FROM ENGLAND.—By Royal Mail from Southampton. Leaves every fortnight. Fare £25 single, £40 return. Voyage lasts 13 days. Can also go by Scrutton's line cheaper, but a good deal longer, also via New York.

2. HOTELS AND THEIR CHARGES.—There is one Hotel in the town of Roseau, suitable for bachelors. Terms 8s a day.

3. PENSIONS OR BOARDING HOUSES AND THEIR CHARGES.—Several kept by ladies, very comfortable and moderate terms, Miss Pemberton's and Miss Shew's specially recommended.

4. HOUSE RENT.—Vacant houses are at present scarce. Rents vary from £30 to £60 a year.

5. COST OF LIVING.—A bachelor living on his own plantation, of careful habits, need not spend more than 30s to 40s a week on housekeeping. A great many spend much less, as they raise their own poultry, sheep pigs, vegetables and fruit. Fish is very cheap and plentiful.

6. SERVANTS' WAGES.—Female Servants get from 3s 6d to 5s a week. Men from 4s to 6s a week, and are usually not boarded.

7. PRICES OF HORSES AND MULES.—Ponies cost from £10 to £20. Mules average £20. Donkeys 30s.

8. HORSE HIRE.—Six to eight shillings a day.

9. HORSE KEEP PER MONTH.—From 30s to 40s.

10. CAN HARNESS AND SADDLERY BE OBTAINED IN THE COUNTRY?—They can be obtained locally, but it is better to get them from England.

11. IS THERE ANY SHOOTING? IF SO, WHERE AND OF WHAT DOES IT CONSIST?—Pigeons (Ramier) Doves, Parrots, Opossum, Agouti and Wild Pig, are fairly plentiful, but shooting in Dominica is not sufficiently good to make it a special object of a visit. A week can however be very pleasantly spent in the forests with a gun.

12. WHAT IS THE BEST RIFLE OR GUN FOR THE COUNTRY?—An ordinary fowling piece.

13. CAN AMMUNITION AND SPORTING REQUISITES BE OBTAINED IN THE COUNTRY, AND WHERE?—They cannot be obtained locally of good quality, but everything can be got from Barbadoes in a few days.

14. WHAT IS THE IMPORT DUTY ON GUNS AND CARTRIDGES, AND WHAT OTHER RESTRICTIONS ARE THERE IN THE IMPORT OF GUNS AND DOGS?—10s a piece. No restrictions on dogs. Long-haired ones are not very suitable. Fox terriers thrive best.

15. IS THERE ANY ANGLING? IF SO; WHAT KIND AND WHERE, AND WHAT BAITS ARE USED?—The rivers are well stocked with fish, principally mullet. Local Grasshoppers make the best bait.

16. AMUSEMENTS, CLUBS ETC.—The Golf Links 9 Holes, are very sporting, and are managed by a Club. There is also a Tennis & Croquet Club. A Social Club House is about to be built. Cricket is also played.

17. ARE THERE GOOD ROADS, AND ARE ANY FIT FOR CYCLING?—Very large works are being undertaken on the Roads, and bridle paths are being turned into Cart Roads. There is a good road round the Island with branch tracks leading up the Valleys. The sum of £15,000 is now being expended in making a central trunk Road, which is intended to open up the very fertile lands that lie behind the seaboard. The island is rather too mountainous for easy cycling but, owing to the improvement in the roads now being carried on, several bicycles have recently been imported.

18. IS THE CLIMATE HEALTHY, AND WHAT IS THE BEST TIME TO VISIT THE COUNTRY?—The climate is very healthy, especially in the mountains. Temperature rarely excessive. Rainfall varies from 60 inches to 200 inches per annum, according to locality and altitude. No special outfit is needed, ordinary English summer clothing does very well. A Terai hat is useful, also strong leather boots. All ordinary articles can be purchased locally at moderate prices. The best season to visit the Island is from November to May; but anyone intending to take up and plant Crown lands, that are covered with forest growth, should commence operations early in the year, so as to get a good "burn" during dry weather.

19. AMOUNT OF CAPITAL NECESSARY.—An intending planter should not be supplied with *less* than £1000. With this Capital he might purchase a block of 300 or 400 acres of Crown lands. He might clear and plant 20 or 25 acres the first year, and ten additional each succeeding year. A cottage suitable

for a bachelor could be built locally, by using native timber and shingles, for something under £75. Sufficient furniture could be purchased for £25. After the first year, the planter ought to begin to make some money out of "catch-crops," such as early vegetables, bananas, tobacco etc. Pineapples yield a crop after 20 months, and their cultivation gives large profits. Vanilla and coffee bear in three years. Limes and oranges give good crops at four years. An acre in cocoa, five years old, ought to yield from six to nine cwt. of beans per annum, and the price, during the last 20 years, has averaged over 60s a cwt. Trinidad cocoa fetches over 90s a cwt., and there is no reason why the Dominica product, if properly cured, should not be equally valuable. Nutmegs are of slow growth, but the value of their yield is very high. The cultivation of ramie-grass has lately been commenced in Dominica, and promises much success. There are vast areas particularly suited to rubber, and the "Castiloa" is found to thrive admirably. In fact, the most eminent authorities on tropical agriculture have given the opinion that owing to its diversity of soil, rainfall and altitude Dominica offers remarkable advantages for the profitable culture of almost every sub-tropical product. There are good shipping facilities to the markets of America and the United Kingdom, and an increasing demand for all its products.

20. SUPPLY OF LBOUR.—The local supply is provided by the coloured inhabitants of the Island, and is fairly abundant. The field hands require to be dealt with tactfully. There is a considerable influx of labourers from the Sugar Islands further north, and in 1899 these immigrants numbered over 1,700. In the event of very large demands arising for an increase of labourers, it is probable that coolies would be imported from India.

21. DANGER FROM HURRICANES ?—Dominica has been remarkably free from hurricanes for very many years. The last severe storm occurred in 1883, but did comparatively little damage. The very accidented configuration of the island would probably prevent any wholesale destruction of growing crops, and there is really very little danger to be apprehended from hurricanes in Dominica.

22. INSECT PESTS ?—The island is very free from noxious insects. Lime trees in some localities are troubled by a borer, but the damage done is, so far, not serious. Great care is taken, to guard against the importation of plant diseases from abroad. There are no venomous snakes and mosquito curtains are rarely used in the country districts.

23. CROWN LANDS *v.* OLD SUGAR ESTATES ?—The whole of the coast lands, right round he island, are occupied by old estates which, for the most part, once produced sugar but are now planted with cacao, limes and fruit. Very few of them are for sale, and it is a significant fact that it is almost impossible to buy, for a reasonable figure, a plantation that is already yielding a large crop of either cacao, limes or fruit. The returns from these products are too valuable to be parted with save under force of circumstances. The Crown lands comprise about 120,000 acres, and occupy the whole of the centre of the island. They are undulating, well-watered, and covered with a magnificent forest growth. The soil, in most places, is remarkably fertile, and no fertilisers would be necessary for many years. In these virgin lands there are practically no weeds, and the continual tillage required on old plantations would be largely avoided.

The felling, clearing and burning of the forests is usually done by native contractors, and it has been estimated that the clearing, draining and planting of an acre of virgin land costs in the first year, between £4 and £5.

The "Imperial Road" which is now being constructed through a large section of Crown lands, opens up two large "spheres" of soil, and will soon render available some 30,000 acres. In one locality, the land varies in altitude from 3,500 feet to 1,000, and this tract is principally suited to the cultivation of high-grade coffee, nutmegs, oranges, rubber and early English vegetables; cacao, limes, vanilla and pine-apples are believed to be better adapted to lands varying from 500 to 1,000 feet, and the best conditions are to be found in the Layou Valley.

24. INSTRUCTION IN AGRICULTURE ?—The Curator of the Botanic Station and the Agricultural Instructor are always ready to afford all assistance in their power, but it should be clearly understood that the Government will assume no responsibility for the success or otherwise of any settler. An intending planter should carefully follow the work that is being carried on in the sample cultivations at the Botanic Garden, and he would gain much valuable information. The planters in Dominica are very friendly and hospitable, and any new-comer with proper recommendations would be welcomed and assisted by them. It would be advisable for any inexperienced person not to decide upon the purchase of land until he shall have stayed some weeks in the Island. He will then be in a position to judge for himself of the merits and prospects of various cultivations, and be able to decide upon the nature and locality of the soil which would best suit his purpose. The return fare to Dominica is only £40, and a month's expenses in the Island could easily be restricted to £20. For an outlay of £60, a single man could most pleasantly spend a couple of months in making a voyage to Dominica and back, and there is every reason to believe that, having once seen that very beautiful and promising Island, he will develop a strong desire to identify himself with its progressive fortunes.

For further information concerning Dominica, see "Report on the Agricultural capabilities of Dominica," by C O Naftel late Inspector of Estates in Ceylon. This pamphlet is published by Messrs. Eyre and Spottiswoode, East Harding Street, Fleet Street, and costs 9½d. It contains a good map of the Island and a large amount of valuable information concerning the cultivation of various products that are suited to Dominica.

NEW AND OLD PRODUCTS.

So far as the Directory estate results have been worked out, the most striking fact to our mind, is the great extension of the planting of coconut palms in the old coffee and young tea districts below a certain elevation. The Dumbara, Matale and Gampola Valleys have long been known to grow excellent coconuts; and still greater success should be anticipated lower down, where soil and climate are suitable. So, it is no wonder that the Kelani Valley planters and their brethren in adjacent districts, North and South, have selected the coco-palm as a second string to their bow, after tea. But we are disappointed to find that so little has been done with the pepper vine, in the districts *par excellence*, best adapted for its growth. We cannot at all see why we should not develope an annual export of first-class pepper, equal to the quantity the Dutch shipped from Ceylon some 150 years ago and which was then nearly all produced by the Sinhalese of the Kegalla, Avisawela, Hanwela and Matara districts. A bounty, a medal and "order of merit" should go to the first Sinhalese landowner bringing five cwt. of good pepper for export from Colombo.

CLOSING OF THE AGRICULTUEAL SCHOOL: MR. C. DRIEBERG.

The fate of the Agricultural School, like that of the "Alfred Model Farm," shews the folly of trying to achieve agricultural improvements among the natives of Ceylon save through the medium of the revenue officers and their headmen, the latter being specially influenced to spend themselves and be spent by the prospect of "honours." That is the talisman that always works wonders among the most apathetic of Orientals and we cannot see why it should not be more fully utilised. Why should the Governor not introduce a native "Order of Merit" to be bestowed, without reference to caste, creed or position, on all natives who lead the way with "new products," or other improvements,—who make two blades of grass to grow where only one grew before? Let the recommendation still come through the revenue (and judicial) officers of the Service, but let the badge and medal be given with due ceremony at an annual Durbar; and we feel sure there will soon be stirred up a spirit of emulation such as we have not seen among the rural Sinhalese for a long time past.

But if the Agricultural School is to be pronounced a failure, and to be relegated into forgetfulness, we feel quite sure this is in no way due to any want of adequacy on the part of the highly-trained, accomplished and zealous Principal. Mr. C. Drieberg has always proved himself a most useful Public Officer. He is "a handy man" only second to Mr. Ellis. What would the Society of Arts, or this or that Exhibition do without Mr. Drieberg? while, as Agricultural Principal, he was never properly backed nor got fair play. We earnestly trust he will have more liberty in his new vocation as Agricultural-Inspector, and that his very useful "Agricultural Magazine" may continue to the benefit of Agricultural teachers, intelligent natives, and even Europeans all over the island.

THE PROPOSED ZOO FOR COLOMBO.

SOME USEFUL INFORMATION FROM THE MYSORE GARDENS.

(Communicated.)

We have noted with pleasure the proposed scheme for a Zoological Gardens for Colombo. It is a wonder that a city and port of such importance, the very playground of all sightseers to the East, and one so easily accessible by steamer to all parts from the globe, should so long have been without one.

A few days ago a letter reached us from the enthusiastic practical collector of wild animals, who has been for some time in charge of the Zoological Gardens

IN THE NATIVE STATE OF MYSORE

Some of his remarks are exceedingly interesting, those especially referring to the hatching of ostriches, in which he has succeeded very well, being the first person in South India who has so succeeded. The young birds we have ourselves seen, and they are very fine, healthy specimens, although born in captivity. Mr. Hughes, the Manager, at first attempted to rear them by means of an incubator, and the young ones were so hatched, but proved weakly and died when a few weeks old. The incubator used was one by Messrs. Hearson & Co., Regent-st., London. It was a No. 35 machine and would hatch from one hundred to one hundred and fifty poultry or pheasants' eggs, and was large enough to hatch ten ostrich eggs.

THE INCUBATOR

was however not made for a tropical climate, and, although for one season, when quite new, it acted well, it afterwards warped and cracked owing to the heat. Had it been made of teakwood, instead of pine or dealwood, it would probably have better stood the test, and satisfactory results would have been obtained.

The working of the machine is very simple. With each machine illustrations are supplied and also two thermometers, one of which is a long one for use in the tank, while the other is a small clinical thermometer to test the temperature of the drawer in which the eggs are placed.

To save time, warm water may be poured into the tank, and the temperature brought up to 76 degrees. The best oil should be used for the lamp, as the cheap and heavy oils smoke too much and clog the tube through which the hot air passes.

When the temperature reaches 96 the capsule inside the drawer expands and allows the hot air to pass directly upwards instead of passing through the tube: as soon as the temperature in the drawer falls below 96 degrees, the damper lowers and the air passes through the tube thereby keeping the machine working automatically. There is a screw on the top which can be screwed up or down according to the temperature required, so regulating it exactly.

The same temperature will do for all kinds of eggs except the ostrich, and the number of days varies according to the subjoined table.

	Days.	At a temperature of degrees.
Ostrich eggs	42	102 to 104
Fowl eggs	21	100
Duck eggs	28	100
Turkey eggs	28	100
Pheasant eggs	23	100

Messrs. Hearson & Company supply books at 1/0, which give full information. Nevertheless,

BIRDS NATURALLY HATCHED ARE MUCH MORE HEALTHY.

About February, ostriches may begin to lay, and the birds should then be carefully watched. If the mother-bird be seen to dig a hole, she will probably lay an egg there in a day or two. If so, the space should be enclosed with mats, so that she may be quiet and screened from the view of visitors or passers by. No bird likes to be watched or disturbed at the laying season. If the mother-bird has selected an unsuitable spot, and if a better

one is at hand, the egg should be carefully removed from the spot where it was laid, and put into the enclosed space which has been provided. In this case the old nest should be destroyed by placing thorny bushes or any other obstacle in any unsuitable spot, as often as she choses such. If the bird appear shy of taking to the enclosed place to which the eggs have been removed, it is a good plan to place her food inside the enclosure for a few days, and she will wonderfully quickly take to the eggs and settle down. If not now disturbed she will hatch successfully, as has been the case in Mysore. The ostrich lays eggs at intervals of four days; and the three young ones naturally hatched in Mysore were born on the 11th, 13th and 16th of August 1899.

One of the three died by being trodden on by the parent-bird when it was only the size of a young turkey. This was owing to a stampede of the larger birds which had been frightened. The other two young ones are now 19 months old, and are, although hatched in captivity, far finer and healthier birds than the parents. The original pair were got from Magersfontein, Cape Colony, South Africa, when full grown, and their price, including shipping, was R1,400 the pair.

THIS SUCCESS IN BREEDING

appears to be unique and has not been accomplished in the Zoo at Calcutta nor in any other Indian gardens. The enterprising Superintendent at Mysore hopes to form a company and thinks there is not the least doubt that Mysore will be the future farm, as it is the best climate for these birds. Why not also Ceylon? The breeding of these birds would probably become a source of revenue to any state. What about the climate of Haputale? And, Mr. Editor, why not utilise the Boers as ostrich farmers? Mr. Hughes writes: "In starting a farm as a paying concern there should be one male bird to four females which should then produce sixty birds a year." His information is valuable because it is not theoretical but practical, and has all been put to the proof. [Photographs of the young ostriches taken at the age of eight months can be seen at *Observer* office till the end of April; also photographs of other animals reared in the gardens at Mysore.]

Referring to the Calcutta Zoo, Mr. Hughes writes: "The buildings at the Calcutta Zoo were created at great cost but some of them are not built in a proper situation; therefore the animals do not thrive or live long. In gardens where records are kept of the longevity of the animals in captivity, great care must be exercised in the choice of building sites, which should be selected by *practical collectors who know the habits* of the animals. I have collected thousands of animals for Mr. Carl Hagenbeck, and know the Islands all over the globe where the rarest animals can be obtained."

THE MYSORE ZOO GARDEN

though small is of considerable interest, and it has just been taken over by the state. Up till recently it was a private concern.

In one part of the grounds one comes to a double railed enclosure forty feet in length by twenty feet in height. Inside the inner compartment is a large stone cage, two stones high; not dark and solid, but with an archway on each of the four sides and covered with creepers bush. At first sight all is silent and empty apparently, but as one approaches there is a strange blowing and breathing like that of angry cats; and looking up one sees a magnificent huddled mass of barred fur, and out of this glare eight fierce eyes. These are a family of four splendid tigers which were caught in the jungles within a few miles of Mysore, in October 1899, by Commissioner H Mathia of Mysore. They were caught by order of the Maharani Regent in Nepal and were then driven into trap cages. The family consisted of father, mother and two nearly full grown cubs. It was at first intended to separate them at once, but the tender heart of Her Highness was so touched by the affection they showed for one another that for a full year she kept the four at Mysore; and only a short time before the death of Her late Majesty Queen Victoria, a pair of them, male and female, and exquisitely marked, were presented to her by the Maharani Regent. The male of this pair (now in the London Zoo) measures 9 ft. 3 inches to the top of crown: but from the nose to the tail it measures 10 ft. 2 inches.

Her Highness took great interest in this

FAMILY OF TIGERS

and allowed them daily as much raw meat as they could eat. The amount allowed to each tiger daily was 16 seers which equals 32 lb. English weight. The cubs generally lay piled upon their fathers and mothers, embracing them with their paws, just as human children twine round and fondle their parents.

Referring to the size of the tiger-cage, as herein specified, Mr. Hughes remarks that that size does not give adequate accommodation, and quaintly adds, "All the Mysore cages are built according to the purse, not according to the comfort of the animals, and I feel for them very much."

The various kinds of leopards are always interesting to watch. There is the restless black panther, almost the fiercest of all the wild animals, which will tackle an animal four times its size. It is never still a moment, but always sidling round its cage, lashing with its long tail, regarding all who approach with fierce furtive eyes, and ready to spring with a snarl and a furious bite at any unwary hand stretched too near. The Maharajah's hunting leopards, with broad leathern collars round their necks, come next. They are useful in hunting large game, and have this peculiarity that they will only strike once at their quarry. However, that "once" seldom fails to be effectual.

We trust that the Colombo Zoo will before long be an accomplished fact and that the scheme will receive generous support from the Government.

S. H. E. AMYAS.

CLARK'S BOOK ON "SPORT IN CEYLON."

(*By "Old Colonist."*)

What a very excellent little book Clark's "Sport in Ceylon" is! Nothing I have ever before read on sport has so fascinated me —and I have often read all that Baker, Forbes and Tennent have said on the subject. Clark has got hold of an admirable literary style, which would adorn any subject, and which he wields with much discretion. No sporting slang there: no bombastic boasting, and *no butchery*. His work, indeed, shows him to be more of a naturalist than a so-called sportsman. I wish, however, I had got hold of such a work 40 years ago; it would have added much to the enjoyment of my life in Ceylon and I rather envy the lot of the young novice who now takes up such a safe and pleasant guide.

My only doubt is as to whether "Sport" gives a sufficient indication of the value of the book. The title has so degenerated that one is apt to fight shy of the drivel under such a heading in the Daily Press.

In my youthful days, my own notions of Sport were such as might have been inspired by Goldy's "tuneless pipe" and even now

"The gay grandsire, skilled in gestic lore,
Can frisk beneath the burden of three-score."

I too have had my elephant hunt in my day, though I never cared to tell the tale! Standing one day in the end of my verandah at Everton, I saw, right opposite, a huge elephant on the top of the Cabaragala cliff, which rises perpendicularly to a height of 500 to 600 feet.

The monster stood coolly wagging his trunk to and fro as he surveyed with evident interest the busy valley below. 'Twas a grand sight, enough to arouse the most dormant of sporting spirits.

I had an English rifle which I shouldered with an air of "who says I'm afraid?"

It took me some hours to climb up through the forest, and when I did reach the rock—no elephant was there, but the fresh droppings showed where he had stood. On the whole rather relieved that my pluck was not put to the test, I took a leisurely look at old Rakwana, and then prepared to descend. Scarcely, however, had I moved from the spot, when I heard a muffled tread and crashing of branches, and sure as I'm a living sinner a herd of elephants passed within easy touch of me! I stood quietly at the back of a tree within a few yards of the edge of the precipice, my heart dunting audibly till I saw the last of the herd move off towards Kukulu Korle!

I escaped unscathed, but had I read such a book as "Sport in the Lowcountry of Ceylon" I would have known better how to go about the business. I should certainly recommend every young man going out to Ceylon, whether as visitor or planter, sportsman or naturalist, to read this handy and eminently useful little book.

Mr. C., I think, rather underestimates the extent of forest in the Central Province and, as to being lost in the jungle, I wonder he does not recommend following the first trickle of water—which has been my invariable rule when everything else failed and by doing so one cannot go very far amiss, in an Island like Ceylon.

THE SCIENTIFIC EXPEDITION FROM PERADENIYA TO OUR RUBBER-GROWING DISTRICTS.

Mr. Herbert Wright, Scientific Assistant at Peradeniya, whom we stated in our issue of 16th ult. to have started on an important tour in the Western and Sabaragamuwa Provinces, has now returned. Though reluctant to give details of his mission until he deals with it officially, we have elicited from Mr. Wright that he has obtained important results in connection with the yield of milk in the indigenous Palaquium trees known by the Sinhalese names of "Kiri-hembeliya" and "Mol-pedda." The Malayan species of Palaquium have hitherto been the source of the different sorts of guttapercha; but these are now becoming extinct, owing to the wasteful method of cutting down the trees for the purpose of collecting the latex. The affinity of the Ceylon flora to that of the Malayan has suggested that our species of Palaquium might also yield gutta of a marketable value, a supposition which now seems justified. From the copious material for detailed and microscopic investigation, which we gather that Mr. Wright has brought back with him, it appears, that there are at least two species of this tree in Ceylon which are deserving of attention from an economic point of view. These have been found to yield, in point of quantity, even a greater amount of milk than most Para rubber trees in Ceylon. Most important of all, however, is the fact that Mr. Wright has found, by a certain method of tapping, that these yield the latex freely without being felled, which not only saves labour, but also the trees, an obvious advantage over the Malayan method.

Asked as to the nature of the soil in which the trees are found in their natural state, "practically nothing but wet sand," is the reply. Their slow rate of growth, we are informed, however, is against their becoming an adjunct to planting products. Many other species of the family Sapotacæ are characterised by the presence of milk, though but few are as yet of commercial importance. A species of Mimusops in the West Indies furnishes what is known as "Gum balata."

TEA PLANTING IN CAROLINA, U. STATES.

The American *Review of Reviews* for March has an illustrated article by "Leonora Beck Ellis" on American Tea-Gardens, Actual and Possible. Most of the illustrations are familiar having done service in some of Dr. Shephard's pamphlets before now. Of course, the paper has to do with Pinehurst; but we learn that, so far back as 1804, a French botanist, Michaux, planted the first tea bushes

in Carolina, of course as ornamental oriental garden plants. The Agricultural Department first tried tea culture in 1881; but the experiment was abandoned in 1883. We ourselves saw a very fine tea bush in the Garden of the Agricultural Department, at Washington, in 1884.—Then we learn from the *Review* how Dr. Shephard took up the cultivation; but no mention is made of the part played by an old Ceylon planter—Mr. Henry Cottam—who, in the course of his multitudinous wanderings, found his way to Pinehurst, and we believe helped Dr. Shephard in some of his early operations and led him to order the *Tropical Agriculturist*. To show that there is an idea of Dr. Shephard's 60 to 70 acres proving the beginning of a great industry, we quote as follows:—

"If America were now raising her own tea, from 13 to 15 million dollars per annum would be kept in this country that under present conditions goes from us into foreign coffers. The sum is modest when compared with those represented by the great staples of America—wheat, meat, and cotton. But it is quite large enough for us eagerly to desire to keep it at home, especially when we reflect that if kept here it would go to support the tillers of the soil in the agricultural South. Over half of these snug millions of good American money we now send to John Chinaman, who raises 49,678,577 pounds of tea out of our average yearly consumption of 92,782,175 pounds. Would not this money make better count for civilisation in building up the homes of our poor white and black toilers? In regard to our supplying other markets than the American, we shall at present venture nothing further than the statement that it is by no means out of the range of possibilities for us ultimately to reach and claim our share also in them. At this a laugh may go around; for it cannot be denied that one successful tea-garden in all this great country seems a fragile base to build great expectations upon. But hark back to the handful of Smyrna cotton seed sown in a Virginia garden in the first quarter of the seventeenth century and carried thence, after many unsuccessful generations of the weed, to the Carolina and Georgia plantations, which seemed to have no need of the insignificant new plant, as their tillers were finding ready wealth in tobacco, rice, indigo and the silk mulberry. At the end of one hundred and fifty years from that first planting of cotton, its harvests were still only slight gleanings from odd corner patches, a purely domestic crop, and by no means a general one. Yet today, a century and a quarter later, undertake to eliminate this weed from the agricultural resources of the South-Atlantic and sister States, and what a transformation must be wrought in the farming life of the section which produces three-fourths of the world's annual cotton crop—what an upheaval, indeed, in the commerce of the world?"

But practical men must be satisfied there is not much in the Pinehurst experiment so far as wide extension goes, when they read the conclusion of the article before us:—

"The question of labor has been dealt with quite as skilfully as the natural problems of heat and moisture; and while it still costs something like eight times as much to have a pound of tea picked in South Carolina as the same service would demand in Asia, yet much of this comparative loss has already been balanced—and much more it is hoped will soon be balanced—by greater productiveness in the field, by the substitution of machinery for hand labor in the factory, and by the manufacture of varieties of teas which, from inherent chemical causes, cannot be brought from the Orient.

"We may not dwell now upon other points, interesting as they are. The practical results of these ten trial years are before us, and tea culture on a business basis is an actuality in the United States. Already rivals of the Pinehurst gardens are being inaugurated in a quiet way—one in Louisiana—another in South Carolina, a third at the Georgia experiment station. Dr. Shephard writes, under recent date, that he has this year increased his tea acreage, outside of the hedges in his park, from 60 acres to 75 and that the crop of 1900 is decidedly larger than in any previous year. Nor did he raise the price of his teas when the Eastern varieties recently went up, a fluctuation due rather more to the short crop in Japan than to the Chinese entanglement.

"Desiring to popularize the American product, Dr. Shephard is holding his prices just where a careful calculation of expenses shows he can afford to fix them. His actual cost of production and preparation for market is now 27½ cents per pound. He hopes to reduce this shortly to 14 cents. At present, the retail price of the 'Standard Pinehurst Black Tea' is $1 per pound. The margin between these figures of cost and selling price must, of course, be shared with the various middlemen who form the chain from producer to consumer, but even after the division a fair portion is left to the tea gardener. The wholesale selling-price, at a conservative estimate, will average up to 50 cents a pound, allowing the producers a profit of 22½ cents per pound, even at the present high cost of production.

"Dr. Shephard's 'Rose Garden' of Assam-Hybrids may be taken as a fair illustration of the possibilities in this new industry of our section. The Rose Garden is a little less than an acre in extent, and was set out in 1890 with nearly 1,000 plants. In 1892 it yielded 56 pounds of green leaves. Nearly doubling its yield every year since 1893, except in 1897, a year of prolonged autumnal drouth, it closely approximated 1,200 pounds in 1898, an amount of green leaf which affords about 300 pounds of the Standard Black. Here, then, was a profit in 1898 of nearly $70 to less than an acre. The present year the productivity is much increased, while the price remains the same. It should be noted in this connection that the most profitable crops in Japan are gathered from plants two hundred years old.

"Again, if the plants in the 'Rose Garden' were placed at shorter distances apart, as is the rule in the Orient and now at Pinehurst, the yield would be proportionately greater each year. But make the most conservative estimate and say 400 pounds cured to the acre, at a profit of only ten cents per pound. Yet, is $40 an acre clear profit regarded as bad farming in this section? We merely hint at the possibilities of expansion when we add that on many estates in Ceylon and India more than 1,000 pounds to the acre is the annual harvest, and that the highest product per bush in those countries has already been reached at Pinehurst. The tea has been a ready seller at $1 per pound, and the demand for it, stimulated by a growing acquaintance with its purity and its delicate and pleasing flavor, is increasing, so dealers testify, more rapidly than the Pinehurst gardens can expand. The lesson

is left with the progressive horticulturists and farmers of the South."

So long as South Carolinians are ready to pay a dollar (4s 6d) a pound for a novelty, good and well; but they must soon know that quite as good Ceylon or Indian tea can be supplied on the spot, duty paid, for 2s a lb. or at most 2s 6d, leaving a fair profit to dealers. And that being the case it is impossible to treat Dr. Shephard's as other than an interesting amateur experiment, worthy of support for the employment it gives to coloured children, but by no means able to compete, in a commercial point of view, with tea-growing in the Orient.

THE DECAY OF COPSE CULTURE.

Not the least hard-hit branch of the farmer's industry is the cultivation of the copse-wood that forms a conspicuous feature in the landscape of many of the Southern counties. Consisting of hazel, ash, alder, and other saplings clustering thickly from a close-cropped stump, the wood of these copses furnished till late years a considerable revenue. The trimming was done on the spot during the cutting of the copses, which were then left to themselves for a term of years till they had grown again; and the trimmed sticks were largely used to supply the wooden bands which formed the binding of the small rough casks in which sugar and other foreign produce was distributed about the country. Now, however, merchants have largely ceased to import their sugar in quantities too bulky for retail distribution; and with this improvement the need for repacking into smaller receptacles has disappeared, and with it one of the chief markets for the copse-wood. Add to this the increasing rarity of labourers skilled in trimming it, and the fact that, though this operation only comes once in several years, it is a lengthy and expensive business, and we have the reasons why at the present day the copses are being left more and more to run wild, and their produce used when eventually cut down chiefly as pea-sticks and firewood, which is all it is often fit for, if not cut at the right period.—*Globe*, March 16.

LARGEST TROUT IN CAPE WATERS.

Some few years ago Messrs Halse Bros. obtained, through the late Mr J D Ellis, a number of trout fry taken from the Hatcheries, Pirie Forest. These were carefully placed in a magnificent dam—one of several on the estate—and for some time nothing was heard of the result of the experiment. Suddenly the hearts of Messrs Halse Bros. and three enthusiastic gentlemen in King were gladdened by the capture of three-year-old trout, weighing respectively 7½lb, 8½lb, and 8lb. 2oz. Now, again, "Carnarvon" has topped the record. On the 20th instant a magnificent trout (four-year-old) was caught in the dam, weighing 14lb. before cleaning, and a trifle over 12lb. after, the length being 31in. Of this Messrs Jakins Bros. have turned out a splendid photograph.—*Natal Mercury*, March 16.

TEA BROKERS' CIRCULARS AND OTHERS.

I notice your contemporary is exercised over the diversity of opinion shown in the various tea circulars. This is surely rather a *naive* way of looking at things. Those who write the circulars are men of flesh and blood like the rest of us and their views are tinged not only by their dispositions, which may be either optimistic or pessimistic, but also by their interests. It may not be generally known in Ceylon that many of the selling brokers have "buying-over" departments. Far be it from me to suggest that this operates against the interests of the owner of the tea. In some instances the reverse may be the case, for the manager of the buying-over department may be able to give an order above the market price. Still if the writer of the circular knows that his firm has a large stock of, say, low-priced Ceylons, he is not very likely to crab common Ceylon tea. As regards China tea, many of the people in Mincing Lane worked in this for years and some of them made fortunes out of it. It is not surprising, therefore, if some of them have a hankering for the good old times when a cargo of tea could sometimes be sold at an all-round profit of a shilling a pound. I think, however, I am expressing the opinion of the vast majority when I say that unless Ceylon and Indian teas become considerably worse even than they have been for the last six months—and there have been some pretty bad ones about—there is no chance of China teas again getting a hold in England. Then there are the dealers' circulars, and very well written some of them are. But it is well to bear in mind that they are written for the benefit of the dealers' customers. If you read in one of them an eulogium of (for instance) Java teas, you need not run away with the idea that the writer has any particular admiration of our brother planters in Java, or even that he is a man of pro-Boer proclivities. Not at all. You simply make a mental note that Messrs. So-and-So have a stock of Java teas and would not be averse to selling them at a reasonable profit.

As the time of the Budget draws near, it is the custom with many dealers to write to all their customers, pointing out that there is a chance of the duty being raised and that it would be a wise precaution to lay in a stock of tea, of which at the moment they have an exceptionally fine selection, etc., etc., etc. Last year the grocers, and others who took the advice so suavely offered them, did well for themselves; this year we hope things will be different; but, in any case, the dealer makes his profit.

No, as things are done in London, I am afraid we shall have to wait for the millennium before the views and ideas expressed about tea are in entire agreement. There is an old saying: "Tell me the company a man keeps, and I will tell you the character of the man." One might paraphrase it and say: "Tell me the business a man does, and I will tell you the character of his tea-circular."—Local "Times" London Cor.

[One of our principal points is overlooked in the above, namely, how is it that with good Ceylon tea so cheap, the export of "China" tea from London keeps up and even showed an increase at the time we wrote? Were we not all assured that when 'Ceylons' fell below a certain price, which they did long ago, they would sweep China black tea out of America and the European continent.—ED. *T.A.*]

BANANA FLOUR.—Attempts are being made to introduce banana flour into Northern markets, which is manufactured on a large scale in Colombia and Venezuela, as well as in Central America. The process of making it consists in stripping the fruits of their skins, cutting the bananas into slices, and drying the slices either in the sun or by artificial heat, after which they are ground and sifted. Thus treated, a bunch weighing fifteen pounds will yield three pounds of flour.—*Grocers' Journal*, March 23.

THE CONDITION AND PROSPECTS OF TEA:

NEED OF GOOD MANAGEMENT AND OF ABANDONING UNPROFITABLE FIELDS.

(*By a Specialist.*)

During the first quarter of the year, the tendency throughout the country has been towards more *careful plucking*. On many estates *fine* plucking has been resorted to; but it cannot be said that this is in *general* favour, the feeling being that, if care is exercised in the selection of the leaf gathered, and no hard or coarse leaf is allowed to enter the Factory, things would soon right themselves. My own conviction is that *careful* plucking, as distinguished from *fine* plucking, is all that is necessary, and if it is continued, it will very soon have an appreciable effect on the output. It may add to the cost of plucking a little, but a better class of tea will be produced; and if India does not look out, we shall be running her very close as regards quality. I do not, of course, mean to say that we shall be able to compete with the better run of places in Darjiling and Assam; but the bulk of Indian teas consists of invoices such as we should have little difficulty in equalling, while cost of production would be in our favour. It is more than ever important, however, that the very best possible attention should be directed towards making the most of all the advantages that Ceylon possesses for the successful working of estates, and we may be sure that

"MANAGEMENT"

will be a very important factor in the near future, more so than it has been in the past. It is quite possible to concede this without saying anything disparaging about planters as a body. It is simply this, that circumstances have arisen which call for *special* efforts on the part of our managers, and unless I am much mistaken, it will be found before long that individuals will be achieving reputations for themselves, and passing over the heads of those who are inactive and do not move with the times. There has probably never been a better opportunity for men with the capacity for dealing with difficulties to come to the front and show us what they can do.

Carefully conducted experiments both in plucking and manufacture may bring to light much that is now hidden and obscure, and there is ample prospective reward for those who are able to distinguish themselves on these and other lines.

Referring to the general question of

"OUTPUT,"

I have all along (as you know) regarded it as a mistake to "rest" tea in the manner indicated by Messrs. Rosling and Rutherford, nor am I in favour of curtailing the yield from estates on the lines laid down by the London Association. Neither of these schemes, even if generally adopted, would be likely to ensure anything more than temporary relief. A better plan would be for estates to *abandon outright* their unremunerative fields and not allow them to be a burden on areas which can be profitably

cultivated, as they frequently are. No doubt there are many estates where all the land that is kept up gives good paying returns; but there are, on the other hand, a number of places where the plucking area might well be restricted without lowering profits or adding in any way to the cost of production.

The relief to the market, if some such plan as this were adopted, would be very appreciable and it would rest on a thoroughly sound basis. "Abandoning" is obviously better than "resting." The latter would constitute a permanent menace to the enterprise, making it difficult to sell estates, or shares in Companies; for who would invest in tea property if it were known that a large acreage of land was resting, waiting in fact in readiness for an improved range of prices to place its produce on the market?

The London people were evidently misled to some extent by the telegram sent home by the Planters' Association after the meeting of the 17th of February. No doubt they regarded the message as indicating that the "resting" scheme had been generally approved, whereas, as a matter of fact, it had merely received the benediction of a very unimportant majority of planters representing not much more than a fraction of the capital of the country. Telegrams such as these should not be lightly sent, but fortunately in this instance no great harm has been done and absent proprietors will have learned long before now from other sources that the "resting" scheme has never received any widesupport in this country. Nevertheless, the agitation will have done good and a distinct check has been given to extensions as well as to the liberal use of manure. With the lesson of last November before them, men will think twice before they again flood the market with poor liquoring teas. Prospects for April and May do not, so far as I can judge, point to anything very exceptional in the way of yield; but there will be a good lot of stuff going forward all the same.

(*By another Specialist.*)

The exports in the first quarter give little clue; for in January, at any rate, the bulk of tea exported was made from leaf plucked in November and December, 1900, before the edict had gone forth to make better tea. Where very close plucking was the order of the day up to January 1901, I believe the altered style reduced the tea made 20 per cent; where men had not gone to such violent extremes as 700lb per acre, I fancy the reduction brought about came to 10 per cent, falling down even by very careful managers to 5 per cent, had weather, style of overtaking pruning, etc. been the same.

In many districts weather has, in the first quarter of 1901, been decidedly showery, which has made the tea flush better than it would have done had the weather been very dry in February and March; but the knowing ones are of opinion that there will be no large rushes of leaf in April and May, as would have been the case if we had a drought in February and March. I believe, therefore, even allowing for a natural in-

crease in young and manured tea, the exports for Ceylon at the end of June will be less than in *1900* by, say, 5 per cent. If we are not tempted to go in for coarse plucking in the last *six* months of the year, there will certainly be 7 per cent less tea exported in 1901 than in *1900*.

Green teas.—Mr. Mackenzie, I see, wires 'a better feeling in the market.' About time! I only hope the wish is not father to the thought. The feeling is now pretty general that our Commissioner ought to reside in America and must be able to advise his constituents, the Thirty Committee, to better purpose than he has done during the last *twelve* months."

NATAL BOTANIC GARDENS.

The Report for the year 1900, by J Medley Wood, A.L.S., has reached us. There is a good deal of interesting reading, especially to Natal Colonists. Here is a reference to the way a very dry year affected fruit crops :—

We have been in the habit of sending out from year to year from 4 to 7 tons of Mangoes, plucked green for making chutney, &c , but last year none were gathered and but very few are left on the trees. The crop of Lichis also was a complete failure, and all other fruit trees suffered in a similar way.

We take two further paragraphs showing how certain tropical products will not grow in the "Garden Colony" of South Africa :—

Cola acuminata.—This is the tree which produces the Cola nut of commerce, and I regret to have to report that all the plants are dead ; the soil and climate do not appear to be suitable to the growth of the tree

Theobroma cacao.—I regret to have to report that all the plants placed in the open ground have since died ; two were reserved for the conservatory and these are alive and healthy. I have never thought that this plant would succeed in the colony as our climate is not sufficiently tropical for it ; in the summer it is warm enough but the cold winter months are not suited for plants of this kind. I have several times had sent to me fruits which were said to be Cocoa grown in the colony, but they have always turned out to be those of Carolinea, or Pachira alba, a plant in no way related to the Theobroma.

TEA PROSPECTS.

(Extract from Geo. White & Co.'s Annual Tea Report, for 1901.)

PROSPECTS.—Although the present Season closes without any near prospect of relief, so far at least as the value of common and inferior grades of all kinds are concerned, the position can hardly be considered as devoid of brightness in the future, as in the nature of things it will work out a cure for itself, though in doing so individual interests may suffer. Production has overtaken immediate requirements, but the Trade is a sound one and if given a respite from the burden it has lately had to bear in the way of excessive supplies it should right itself ere long, partly through the expansion of business fostered by low prices. It is to be hoped also that the action to restrict output taken by the Committee appointed by the Indian and Ceylon Tea Associations may bring home to Directors of Companies, Owners, and Managers of Estates generally, the absolute need of serious attention to this matter, and, although it may be difficult to formulate any scheme which can be universally adopted, that all will strive towards the desired end. In many cases it may be feasible to gather the leaf more quickly, i.e., without letting it run so long. In others finer plucking may be resorted to, or portions of p operties which do not give an adequate or satisfactory yield may be allowed to lie fallow. Planters in India specially may elect to finish their Season rather earlier and thus curtail the crop, while on some gardens in Ceylon more rest may be given to bushes where stimulating manure has been used. In different ways therefore the same object may be kept in view, the result being that the Industry will assume a healthier condition and that the cloud which now hangs over it will gradually disperse, leaving behind a lesson which should not however be forgtten for many years to come.

While there is much to be done by Producers, Distributors are not backward in taking their part and progress is being made in this respect, though slowly in some quarters. The Continent of Europe, and especially Russia, is consuming more British-grown tea every year, consequent on the persistent efforts of exporters both in this country and at the ports of origin. In Canada and the United States of America many are engaged in pushing the trade, and so in spite of a number of drawbacks the produce of India and Ceylon is gradually being more used in other countries than our own. If the manufacture of green teas suitable for the requirements of our Trans-Atlantic cousins should prove a success, as is confidently hoped by those who have taken it up so earnestly, a further important step will have been gained and one which will afford great relief to all concerned.

Another matter which should engage notice is that of encouraging retail sales locally, and it does not seem beyond the bounds of possibility that herein may be found an outlet for coarse leaf which might be sold at such a figure as to induce the natives to be large consumers and yet be remunerative to growers. In this connection it may be noticed that a considerable business is at present transacted by South Indian Estates, chiefly from the Nilgiris, whence the people all along the West coast up to Bombay are principally supplied. A certain amount from Ceylon too also finds its way there. This is done entirely through native shopkeepers and there is no doubt that the existing demand in the bazaars might be much inc. eased by the offer of cheap tea in small packets. It is estimated that already 4¼ million lb are disposed of in India alone.

MANUFACTURE.—With reference to the treatment of the leaf, what we wrote last year seems still applicable, viz. :—"Taking into consideration the larger area coming into bearing in some districts, it would seem policy to avoid very coarse plucking and the manufacture of undesirable sorts which foster a low quotation here and tend to glut the market. Where briskness, pungency, or full-bodied liquor are attainable, every effort should be put forth to secure these characteristics. Plain featureless teas are more or less neglected, especially in the very busy months, and good appearance without sterling cup no longer satisfies even the Continental buyers who used to take that style of China Congou."

There have been occasional instances this season of breaks tainted apparently by eucalyptus leaves (where these trees are cultivated) having been

allowed to find their way into the picker's basket, and becoming mixed up with the tea during manufacture, which frequently leads to less competition among buyers, and should be guarded against.

The number of "cheesy" lots has again considerably decreased, due possibly to more thorough final firing, and also to the extended use of patent packages (especially of those lined with thick lead) of which such a large portion now arrive. Partly due to weak wood, but more often to carelessness in loading on board the steamers, damaged packages have given much trouble recently, involving loss in weight and necessitating an allowance to buyers. Some economy has been effected by slight reductions in warehouse charges, and also by the adoption of an improved system of weighing by the Customs.

THE OLDEST RUBBER PLANTATION.*

In the *Indian Forester* (vol. xxiv., p. 160), I presented some facts in relation to the oldest India-rubber plantation in the world, which is located on the Pamanukan-Tjiassem estate, in the Residence Krawang, in Java. At that time I wrote that the plantation came into existence in the year 1872, basing my information on personal conversation with the owner of the estate, but the opinion of the present chief overseer, Herr van Henkelom, seems to be that the plantation dates from the year 1864.

The young plants of *Ficus elastiea* were obtained from the adjacent forests, by cuttings of branches, or by marcotting the uncultivated trees, an operation to which the inhabitants of Java frequently resort. The before-mentioned rubber trees are especially adapted to the process of marcotting. All that is necessary is the removal of a strip of bark ¾ centimetre wide, and to bandage the wound with earth. After about fifty days roots will appear through all sides of this ball, which can then be cut off. It is advisable before planting these young plants, which are about ½ metre in height, to place them, or rather nurse them, in rich, well-shaded soil for a period of about fifty days, in order to heal the cut thoroughly.

It is my opinion that the original cost of this plantation on the Tjiassem estate was not very much, because the *Ficus elastica* was planted about 8½ yards apart each way, or 72 to the acre, within coffee plantations which were no longer productive, and required not much cultivation. I estimate the cost of the plantation at about $7 per acre. Altogether 72½ acres, embracing 5,200 trees, were planted.

The first tapping was done in 1886, and the following figures will give the details:—

Years.	Pounds.	Average ounces per tree.	Value.
1886 ..	5,512	17	$2,880
1887 ..	4,954	15	2,592
1888 ...	1,514	4	792
1890 ..	3,307	10	1,728
1891 ..	6,113	18	1,858
1892 ..	5,992	18	1,229
1895 ..	3,197	10	1,973
1896 ..	3,113	10	1,561
1897 ..	6,731	21	3,648
1898 ..	6,731	21	4,213
Total..	47,164		$22,474

* This letter is reproduced from *The India Rubber World.*

Tappings could not be made in every year. In thirteen years (in three of which the trees were not tapped) a total of 47,164 pounds was harvested, an average of 3,628 pounds per year, or 10 ounces per tree per year. During the four years 1895-98, the average was 4,943 pounds, or 15 ounces per tree. The yield per acre, therefore, from 1886 to 1898, averages 50 pounds, and from 1895 to 1898, 68 pounds.

The figures given above, by the way, in the column headed "Value," must be understood as referring to the income to the planter after deducting all expenses, not only of harvesting the crop, but also the initial expenses and the yearly expense for care of the plantation. From the information supplied to me in regard to the prices obtained for the rubber, I should infer that the yearly expense for the last four years covered by the table had amounted to an average of $12 per acre per year.

An analysis of the figures above given will show an average yearly nett profit of $39·30 per acre, the figures for 1898 showing a profit per acre of $58.

With respect to the possible yield from *Ficus elastiea*, it may be mentioned that Herr Mulder, in Sudimara (West Java), obtained in 1897 from three trees 48 kilograms, and 20 months later from the same trees 45 kilograms. This is respectively per tree 35½ pounds and 33 pounds.

A. H. BERKHOUT,
Late Conservator of Java Forests.

Wageringen, Holland.

—*Indian Forester* for April.

TEA REFORM.

(To the Editor of the *Home and Colonial Mail.*)

Sir,—What I would suggest is that the Tea Associations of India and Ceylon be organised on more comprehensive lines—that all tea proprietors, whether public companies or private concerns, and their agents, become members of one or other of those associations; that suitable persons from among them be elected and appointed to act as a general committee, to whom questions relating to the tea industry should be referred, and upon their report on any important question being submitted, a joint meeting of members of both associations be convened for the purpose of approving or of modifying, if necessary, such recommendation, and when finally approved and accepted that decision to be loyally observed by all members.

At present these associations appear to represent only a portion of the tea proprietors of India and Ceylon. To make them really effective every producer should be a member. At present their views and recommendations, however sound and excellent, are merely an expression of opinion, which has not the weight and force of authority as of an association representing the whole body of tea producers. This is not as it should be.

Reform is also much needed in other directions. A great deal of complaint is heard of the general low class of teas manufactured during the past few years. It is a strange coincidence that with the introduction of machinery quality generally has fallen in the same ratio. In this connection I do not lay the blame on the adoption of machinery, but on the practice of working up a coarser class of leaf by machinery than could be done by hand, in order to increase output.

The Use of Fertilisers.—In Indian plantations very little is done in the way of applying fertilisers to tea plants. The consequence is that in

the older portions of a garden the quality of leaf deteriorates, and a low class of tea is produced. Can this be surprising when for decades gardens are plucked season after season without an ounce of manure of any description being applied to the soil to compensate for what has been so persistently taken from it?

What is surprising, however, is that in Ceylon, where manuring is a great feature in cultivation, the average value of the tea produced is lower than that manufactured in India, where practically no manuring is done. This fact would argue that the effect of fertilizers is turned to account in Ceylon by increasing quantity rather than by improving quality by a system of plucking coarse overgrown leaf. This would go a long way towards accounting for the large proportion of coarse teas which have done so much to overstock the market.

There is yet another practice which accounts for a large quantity of coarse tea—i.e., the undue prolongation of the plucking season. I know, as a planter, how anxious every manager is to avail himself of every obtainable leaf towards the close of a season to enable him to get nearer the quantity estimated to be produced, but it is at the best only a low class of tea with an autumnal flavour, the product of a plant whose life energy is sapped by the plucking of leaf at a time long after the tea bush should have been at rest—recuperating itself—it left unplucked.—Yours truly,

JAMES HODGES.

4, Birmingham, March 19, 1901.

THE IMPERIAL TEA DUTY.

TO THE RIGHT HONORABLE THE SECRETARY OF STATE FOR INDIA IN COUNCIL.

MY LORD,—I am directed by the Indian Tea Association, London, to address you on the subject of the late enhancement of the Import Duty upon tea, with a view to your urging the Chancellor of the Exchequer to reduce the duty to its former level of 4d per lb.

The Industry which this Association represents, though supported by many millions of British Capital, is carried on in India, and is thus, perhaps, outside the sympathetic consideration of the Chancellor of the Exchequer. Indian interests are, however, especially within your Lordship's cognizance and protection, and the Association ventures to hope for your sympathy and assistance in the present highly critical state of the Industry.

That Industry has brought wide and unhealthy wastes under cultivation, it supports several hundreds of thousands of native labourers, and it makes a material contribution to the Land Revenue of the Empire of India. It holds an important position in Northern Bengal and Southern India, and is the very backbone of the well-being of the Province of Assam. Moreover, after some vicissitudes it has proved financially a success. The Industry for a considerable period prior to 1897 showed a steady prosperity. It was found to return to English investors regular, and in some cases liberal, dividends. This prosperity naturally attracted further capital, which was employed in making additions to the area under Tea.

These extensions were perhaps in some cases unduly large, but they would have had no serious effect upon the well-being of the Indian Tea Industry, but for the occurrence of two grave events.

The first of these events was the action taken by the Government of India by which the exchange value of the rupee was fixed at about 1s 4d. Without entering into the question of the effect of this action on the country generally, I am desired to point out that the policy adopted has undoubtedly resulted in heavy loss to the Indian Tea Industry. The artificial enhancement of the rupee has, in regard to Tea, greatly increased the cost of production, and has thereby reduced the margin of profit to an extent which can hardly be conceived. But for the very serious increase in the cost of production caused in this way, producers would now be able to accept with small risk of loss, the low prices of Tea at present ruling.

The second event was the addition last year of 2d per lb to the duty, which is proving most injurious to the producers of Indian tea. The increase in the duty cannot fail in one of two things: it must either, by an increased price exacted from the consumer, check consumption, or, if not paid by the consumer, it must come out of the pocket of the producers. The result so far appears to be that the increase has materially checked the regular expansion of consumption, and at the same time thrown upon producers the payment of a large share of the additional duty.

These two events have so seriously affected the Indian Tea Industry—the first by raising the cost of production, and the second by reducing to the producer his net profit—that, coming as they do on the top of the increased production, they have brought the Industry into such straits that at the present moment but few tea properties can be carried on without loss.

It is hardly necessary to point out to a statesman how much the failure of a large proportion of the Indian Tea Industry is to be deprecated. The public revenues both of Assam and Bengal are much interested in the prosperity of Tea, and if, as seems probable, many estates must be closed up, the distress to the labourers employed on them will be very great. Moreover, I am to urge upon your Lordship's consideration that, both for the United Kingdom, where capital is ever seeking for new channels of employment, and for India, where capital is greatly needed, it would be a mistaken policy to allow the one Indian Industry, into which private capital has flowed freely from this country, to be crushed in its hour of weakness and difficulty by the addition of heavy State burdens.

The Association desires to draw attention to the very heavy percentage which the Duty on Tea now bears to the wholesale price of the article. In 1881 the average price of Indian Tea in London was 1s 5d per lb., the Duty being then 6d per lb. (about 35 per cent). In 1891 the average price was 10½d, the Duty being 4d, or about 38 per cent. During the current season the average price has been 7¾d, and at the present moment it is about 6d, while the Duty is also 6d, or 100 per cent. on the average price. Large quantities of Tea are now being sold at less than 4d per lb., the Duty here being 150 per cent. Accompanying is a statement showing the average price of Tea from the Tea Districts of India, giving the above figures in the form of a comparative statement.

There is one further point to which the Association respectfully venture to draw your attention. While agreeing with the Chancellor of the Exchequer in thinking that "a very large class of the population who do not pay income tax, who do not consume alchol, and do not smoke," should contribute towards the expenses of the South African war, they do not consider it to be equitable that Tea alone, of the commodities used by that class of the people of England, should be singled out for an increase of Duty. It seems to the Association that there are other commodities more capable than Tea of bearing increased taxation—Cocoa, Coffee, and Sugar for instance. The Duty on Cocoa, the consumption of which has largely increased of late years, varies between 1d and 2½d per lb. for different qualities, that on raw cocoa being 1d. The quantity of raw cocoa entered for home consumption in 1879 was

10,111,526 lb. as against 37,750,000 lb. in 1900, showing an increase of 270 per cent, while during the same period the consumption of tea rose from 160,500,000 to 249,750,000 lb., being an increase of 55 per cent only.

The duty on coffee, which has an average value of 8d per lb., is 1½d per lb., or only 25 per cent of the duty on tea, with which article it competes as a beverage.

Sugar at present contributes nothing to the Exchequer, but a duty of even ½d per lb, which could hardly be felt by consumers, would realise, it is calculated, about £6,750,000.

My Association have endeavoured to show in this letter that the increased duty has struck their Industry heavily at the very moment when, from other causes, it was least able to bear up against such a blow. They now venture to pray your Lordship to press upon the Government the serious nature of the crisis in which the Indian Tea Industry is involved, and the disastrous effect upon it of the continuance of the present high rate of duty.—I have the honour to be, My Lord, your obedient servant, ERNEST TYE, Secretary.

PUBLIC SALES

District.	On Garden Account for week ending February 16th, 1901.			
	1901.		1900.	
	Pkgs.	Average Prices.	Pkgs.	Average Prices.
Assam ..	23,574	7·01	14,778	9.08
Cachar and Sylhet	12,543	4·82	10,767	6·83
Chittagong ..	146	5·66	—	—
Chota Nagpore ..	—	—	46	6·25
Darjeeling ..	1,751	8·70	2,202	10·87
Dooars ..	9,278	5·05	4,573	7 04
Kangra, &c. ...	—	—	—	—
Nilgherry ..	303	4·70	11	7·25
Terai ..	154	4·75	149	7·75
Travancore ...	1,691	4·39	44	6 75
Total ..	49,440	6.04	32,570	8·12

TOTAL SALES

District.	On Garden Account from June 1st 1900, to			
	1901.		1900.	
	Pkgs.	Average Prices.	Pkgs.	Average Prices.
Assam ..	471,732	8·51	453,117	9·34
Cachar and Sylhet	292,340	5·80	305,479	7·09
Chittagong ..	5,895	6·35	2,977	7·46
Chota Nagpore ..	1,304	5·30	1,649	6·25
Darjeeling ...	76,140	9·78	61,402	10·74
Dooars ..	145,089	5·64	125,529	7·38
Kangra, &c. ..	5,260	6·10	10,879	7·06
Nilgherry ..	3,749	5·90	4,629	7·30
Terai ..	12,110	5·96	12,055	7·26
Travancore ..	34,066	5·53	29,418	6·83
Total ..	1,047,684	7·30	1,007,134	8 36

THE BAHREN PEARL FISHERIES.

In the centre of the broad V-shaped bay, that separates El Katr from Turkish El Katif, lies the object of much solicitude, viz. the Island of Bahrein, famous throughout the world for its pearl fisheries which rank with those of Ceylon. The island is thirty miles long and from six to nine miles broad. The pearl fishing at Bahrein lasts according to an Indian report from June to October, and it is pursued not only at Bahrein but along the entire Arabian coast. The Bahrein banks, stretching for a length of four to five leagues are, however, the richest and most certain. At the season of the fisheries some 4,500 boats of every size and rig may be seen, all busily employed. They carry from five to fourteen men each, and the total number of hands engaged is said to be 30,000. The scene is one of the greatest picturesqueness and animation. Like most of the gulf ports and trading settlements, it was taken early in the 16th century by the Portuguese who established a station there and at El Katif, to ensure a monopoly of the pearl trade. When the pearls have been picked out of the shells they are handed to the master of the boat who proceeds to sort them by the manipulation of a triple set of brass sieves pierced with holes of different diameter. The pearls that are unable to pass through the largest sieve are called "Ras," the residue of the second sieve are "Batin," while the resulting contents of the third sieve are known as "Dzel." Made up into separate batches, according to their classification, the assorted pearls are then sold to the pearl merchant upon an intricate scale of values, depending upon the shape, colour, specific gravity, and size. The merchant re-arranges them in small packets and despatches them to the Indian market whence a great many go back again to Arabia and Persia. Generally speaking, the Bahrein pearls are not so white as Ceylon pearls but are larger and more regular in shape; while they are said to retain their lustre for a longer period. The Ceylon banks require to be carefully watched and fishing is only permitted by Government at various periods. On the other hand, the Gulf banks give no indication of a failing supply.—*Journal of the Society of Arts*, March 15.

THE AXE AND THE TREES:

A REVIEW OF THE WORLD'S TIMBER SUPPLY.

Timber for ordinary building is dear at present, a fact which renders the public rather more attentive to the voice of the professional forester than it generally is. The figures and areas dealt with by experts in this art are generally so large that they are looked on as rather outside the range of practical business. But the shrinkage of the world is bringing all its "timber properties" into reach. Their sites, boundaries, and contents are all well known, with one notable exception, that of the great tropical forest which belts the globe; and all nations and languages—the civilised ones, that is to say, for the savage, like the peasant, is always the enemy of trees—are beginning to take stock both of the waste and extravagance of the past and of

THE PRINCIPAL LEFT INTACT FOR THE FUTURE.

Among the latest lights on this subject are a paper read by Dr. Schlich before the Society of Arts on the outlook for the world's timber supply, the Reports of the Forest Commissioners of the United States, the handbooks of the New South Wales Government, and a paper by Mr. Alder Anderson in *Pearson's Magazine* for February on "Russian Imperial Forestry." Most of the demand for European timber has been met hitherto from Sweden and Norway. But this supply is not sufficient, and the Russians are getting their forests into order to meet the coming demand. Their autocratic Government has passed Forest laws almost as strict as those of the Norman and Ang vin Kings, with this difference, that, while the latter laid an embargo on private lands, and forbade the owners to cut down their trees that the cover for game might remain, the Russians forbid private owners to cut down their timber except under Government inspection, and recognise no absolute ownership in trees except by the State, in

order to protect the forests themselves: They affect to regard the woods as part of the balance of Nature, which must not be disturbed to the possible detriment of the community. Parts of the steppes are being planted, and all woods cut down are at once replenished with a suitable stock. The general aim of the Government is to bring the line of the woods further South, where they will be useful to protect the corn-growing plains, as well as nearer to the navigable parts of the great rivers pouring into the Euxine and Caspian.

DR. SCHLICH'S OUTLOOK

over the world's forests is not only comprehensive but detailed. He knows, so to speak, where the shoe pinches, and shows the present uselessness of great areas of wild timber for the wants of the hour. All Northern Siberia is covered with wood,—but it is too far off for transport. The United States' lumbermen have been so wasteful that the Government have had to take over the woods and limit the output. It is impossible, he thinks, for the United States to go on for any time spending the capital of their trees. For some years they have been using 33 per cent more timber annually than their woods can replace by natural growth. He is probably rather too pessimistic on the subject of Canada. That is, except the prairie region and the barren lands, one immense forest or wood. It is the perfection of a timber ground, for all through these forests there are lakes, rivers, and streams without end, almost naturally connected, to transport the trees by the only means which pays in the timber business, viz., by water. The Dominion now draws £700,000 a year from these forests, which cover with spruce, pine, maple, poplar, and oak a region nearly as large as the whole of the Indian Peninsula. The corn-growing region seems already marked out by the natural absence of forests. The prairies of Manitoba are already clear, so that the ground on which a natural crop stands ready need not be ravaged to make room for the first necessity,—bread. Mining and manufacture are increasing in the Dominion, and with a concurrent demand for timber, which will be a source of revenue, there is every reason to think that the

CANADIAN FORESTS WILL BE AN IMMENSE ASSET

of the best kind. Among the paradoxes of the timber trade, pointed out by Dr Schlich, two are very striking. The first is a detail, but a suggestive one. In the great mahogany-exporting regions on the Caribbean Sea, the export is almost balanced by the import of building wood, though the mass of the Central American forest lies behind them and at their doors. Into the whole British Empire, including our Colonies, with their vast area of trees, we import £18,000,000 worth of wood every year, and the amounts rise by about £700,000 per annum. It is from Canada, from our own great Colony only separated by a week's sea voyage, and not from Russia, that we should hope and desire to draw the pine and fir for our ordinary domestic use. The hard woods of the Dominion will probably be needed for home use and for the States south of the great lakes. But it is a pleasant and probable forecast to picture the millions of acres of the great Canadian woodlands preserved and prosperous, the forest populous with deer and moose, the lakes and innumerable rivers full of trout and salmon, at once the source of riches to Canada and the great reserve for sport and recreation for Englishmen at home and over the seas.

If there is a real rise in the price of timber before the supply overtakes the demand, it may

ENCOURAGE THE PLANTING OF WOODS

in this country. We wish it were possible now to advocate this as a commercial enterprise. But common knowledge holds the contrary opinion, and Sir W Thiselton-Dyer himself, under whose control Kew has become more than ever a practical oracle on the natural products of earth, holds that, as things are, it can never pay 4 per cent. It has been said by good authorities that land letting for less than 7s per acre will, as a rule, pay when planted. There is also a great sentimental inducement to do so. The present rating of plantations is almost Turkish in its strangling effect. The ground is rated as soon as it is planted. Not a penny comes in for at least ten years, yet the rates may be anything from 2s per acre upwards. The rate might be dropped and *deferred*, and then re-imposed in the form of a duty when the trees are felled. This would make the heir to the trees pay the taxes, and not the planter of them, and would be no more a hardship than the payment of succession-duty. Partly from its moist climate, partly from the abundance of hedgerows and hedgerow timber, we in this country have not felt the real damage caused by the absence of woods which accrues in mountainous Italy, or sandy Germany or Russia. Otherwise we should probably give bounties for tree-planting, instead of imposing taxes. Outside,

IN GREATER BRITAIN, OUR NATURAL FORESTS ARE ENORMOUS,

and, on the whole, singularly little damaged. India, as Sir Dietrich Brandis has more than once shown, needs much of her woods for other purposes than timber. They are the great reserve of cattle food in famine, the collectors of moisture, the feeders of rivers, the maintenance of mountain waters. Still, that national wood reserve, with teak at one end and deodar at the other, yields a splendid and increasing revenue. But, by what seems almost a stroke of luck, our other great Colonial forests have largely escaped the waste suffered by the other nations of the world. We have no part of our territory where the wood has been utterly or mainly ruined, as in Italy, in Spain, in Greece, in parts of Turkey in Europe, and vast areas in the United States. The slow peopling of Canada saved her woods during the "stupid" period of colonisation, and now they will be preserved. Our greatest hard-wood province or continent is perhaps Australia. Only one of the native trees seems to have been destroyed, the red cedar, and that is a furniture wood. There are five million acres of State forests of sorts in New South Wales alone. The number of species of hard-wood trees is unusual, and they are exceptionally lofty. This is one of the great desiderata of the builder, and one which English timber never fulfils. In replacing two of the cross-beams in the roof of Winchester Cathedral, English oak of the proper length could not be got at a reasonable price. The first ten forest trees on the New South Wales list average from one hundred feet to one hundred and fifty feet at full growth. Behind these Colonial supplies lies the enormous and

UNTAPPED RESERVE OF THE TROPICAL FORESTS

of Guiana, of West Africa, and, if we buy from our neighbours, of the Amazon, the Orinoco, and of the Philippines, where the trees average two hundred feet in height, and water-

ways are abundant, and penetrate the forests. These woods will stand till they are wanted, for the sound of the axe is not heard in them. In many the natives do not know even how to handle the implement. When making the Uganda Railway for instance, the natives were so awkward at its use that they begged to be supplied with *swords* instead to cut down the bush.—*Spectator*, March 9.

THE LINNÆAN SOCIETY.

At the last ordinary meeting, held at Burlington House, Piccadilly, Professfor Sidney Vines, F. R. S., the President, occupied the chair. Mr H E Smedley exhibited and described a series of botanical models. Among the most striking were a flower of *Rafflesia Arnoldii*, about a yard across, a native of Sumatra, parasitic on the stem and roots of a species of vine, the cups of pitcher plants, sections of garden flowers, and, on a greatly enlarged scale, the reproductive organs of the pine, showing the process of pollination, the development of the pollen, the structure of the ovule, and the process of fertilisation. With these were shown some models, also greatly enlarged, of amœba ingesting food, the slipper animalcule, the bell-animalcule and the green hydra in section, with bud and ovary, to emphasise its two modes of reproduction. A paper by Miss Gulielma Lister on the occurence of *Tristicha hypnoides* in Egypt was communicated by Mr Arthur Lister, F.R.S. This species belongs to a group of aquatic moss-like flowering plants growing on rocks more or less covered by flowing water. It was met with among the islands below the First Cataract and the interest of the find lies in the fact that till now it was believed that the species did not flourish north of Abyssinia.—*B. and C. Druggist* March 15.

MINES AND MACHINERY ORDINANCE.

The following regulation made by His Excellency the Governor, with the advice of the Executive Council, under the provisions of section 4 of "The Mines and Machinery Protection Ordinance, 1896," is published for general information: —Every entrance to or exit from any mine, and all machinery at or about such entrance or exit, shall, if situated within 20 yards of a public road, be screened by a screen at least 8 feet high of boards or other sufficient material so as to be effectually excluded from the view of persons and beasts of burden using such road.—*Gazette*.

A CRYPTOGAMIC BOTANIST FOR INDIA.

The second appointment in the British Empire of a scientific man to devote his time to the organisms causing disease and death to plants was recently made in London and the recipient, Dr. Butler, with Mrs. Butler, has been staying a few days at Peradeniya; but will leave by the ss. "Borneo" for Calcutta. His official designation is not Mycologist, but the perhaps more correct title of "Cryptogamic Botanist." Dr. Butler, who has already done excellent original work, has studied in Ireland under Prof. Marcus Hartog of Cork University (whom we remember well when under Dr. Thwaites in Ceylon), and later when in receipt of a research scholarship, in Paris. Dr. Butler is an enthusiastic "plant doctor" and no doubt will be of great service to Indian agriculture, although his field of work between Cape Comorin and the Himalayas is wide enough, we would think, for half-a-dozen or more of Cryptogamic Botanists.

CEYLON TEA IN RUSSIA.

ANOTHER RUSSIAN TEA FIRM TO BE REPRESENTED IN COLOMBO.

One of the best evidences of the progress of Ceylon tea in Russia is to be found in the increase in the number of Russian tea buyers in Colombo. The latest arrival is Mr. W P Ampenoffe, who represents one of the largest firms in Russia, known as "The Trading Company, successors to Alexis Goobkin, A Koosnetzoff & Co." Mr. Ampenoffe will be heartily welcomed by the whole of the mercantile community. The firm which Mr. Ampenoffe represents has been dealing largely in Ceylon teas, and he has been sent out to Ceylon owing to the increasing business of the firm. Hitherto, there were three Russian and one English house buying tea for them locally. Speaking of the progress of Ceylon tea in Russia, Mr. Ampenoffe testified to the growing taste for it. A good deal of it was sold pure, he said, but the people still preferred a mixture with China tea. The medium class of Ceylon tea was liked best. Mr. Ampenoffe, from some figures in his possession, pointed out that the Ceylon exports to Russia could hardly be compared to the 55 000,000 lb. of congou tea alone that was now imported, but he believed that the amount of Ceylon tea going annually to Russia was bound to increase. What chances Ceylon green tea would have in Russia he was unable to say. A good deal of China green tea was now sent. —Local "Times."

RICE IN COCHIN CHINA.

RICE-MILLS INCREASING.

Saigon, March 3.—A new rice mill has been started this year—the "Yee Cheong" mill. This brings the number of our mills to nine, of which seven are Chinese and two European, all of which are big ones. This seems also to be an indication of the prosperity of the country, if we consider that in Tonkin not a single steam rice-mill exists yet. Cochin China exports yearly almost 12 millions of piculs of rice or paddy of different sorts and everything is on the increase.—*Hongkong Weekly Press*, March 16.

ADIANTUM FARLEYENSE.—This magnificent East Indian species may well be termed the Queen of Maidenhairs. The large lobes of the fronds are finely crimped, so that the effect is splendid. As an exhibition plant there is no mistaking its value, either as a single specimen or in a collection of Ferns, judges too rarely seeing it in perfection. I have found the most common error is to put too much peat in the compost. In commencing the cultivation use clean pots and ample drainage. The compost I have used with conspicuous success consisted of two parts of loam, one of fibrous peat, leaf mould and coarse silver sand. Cover the drainage with the rougher portions and pot somewhat firmly, lightly watering the following day. Place in a temperature of 55° or 60°, being particular not to overwater or expose to bright sunshine, or the plants do not assume the rich, deep colour found in shaded plants. When the roots fill the pots it will take a good share of water, but too much or not enough will completely ruin its prospects. As Adiantum Farleyense produces heavy fronds a little staking is quite necessary; this, if carefully done, will show no unsightliness. —R. P. R.

PLANTING NOTES.

EUCALYPTUS DISTILLING.—According to the report of the Chief Inspector of Distilleries in South Australia, there are fourteen eucalyptus-oil distilling licences in force in that colony. Thirteen licences are on Kangaroo Island, the other at Punyelroo The value of oil exported increased from £1,131 in 1892 to £2,224 in 1899.—*Planting Opinion*, April 6.

RAW RUBBER NOTES.—It is stated that the rubber trade in the Lagos district has almost reached a position of complete standstill. This anxiety is well founded and there are some substantial reasons for believing that causes other than the failure of the rubber trees are operating to obstruct and kill the trade.—*India Rubber Journal*, March 18.

THE ANALYSIS OF GUTTA-PERCHA—BY H BORNTRAGER.—Crude commercial gutta-percha has the following composition according to the investigations of different chemists:—Water, 1 to 1·5; dirt (wood and soil), 3 to 5; pure gutta, 30·5 to 83·5; albane, 7·0 to 44·5; and fluavile 3·0 to 21·0 per cent. An analysis of a sample of crude gutta-percha by another method gave the follwing results:—Water, 1·5; dirt, 2·5; pure gutta, 77·5; fluavile. 6; albane al. 3·8; albane a2, 3·7; and albane a3, five per cent.—*India Rubber Journal*, March 18.

INFERIOR TEA.—It is all very fine (says the *Indian Planters' Gazette*) for our local papers to gird at the Ceylon and South Indian planters for sending out refuse tea for local sale, and even export; but what about our own damaged and repacked? Hardly a sale passes during the monsoon without several chests being put up under the above denomination. What becomes of them? and have brokers a right to publicly auction damaged food goods? Is the Calcutta Health Officer a dummy? Any muck brought forward ought to be forthwith confiscated, and the Tea Association are bound to see to this for the sake of the good name of our teas.

DOSING AN ELEPHANT.—A difficult operation was performed the other day at the Zoological Gardens at Hanover. An elephant was suffering great pain from a growth on the lower part of one of its hind feet, and it was deemed necessary to cut this malformation away. In order to render the animal insensible a dose of 600 grains of of morphia in six bottles of rum was administered. This dose took about an hour before any visible effect was produced. The elephant then fell over in a kind of sleep, and the operation was successfully carried out without any further ado. The operation lasted in all three days.—*Globe*, March 22.

THE SEASON AT DAREJEELING.—March 4.—Darjeeling has burst into spring early this year, and nothing could surpass in India the beauty of the last three weeks, soft cloudless skies, bright cheerful sun, the long line of snows clear but not hard, taking delicious colouring in the early morning and late afternoon. Rhododendrons are already bursting into their glorious blooms of white, pink and scarlet, and trees are putting on their young light green, and very soon the hill-sides will be white with magnolia. True indeed it is that only the cold weather residents of the place ever see Darjeeling at its best, for, barring six weeks of rather dreary cold and mist, the climate this winter has been perfect.—*Pioneer*.

SUGAR AND JAGGERY FROM NEW SOURCES.—An attempt has been recently made by the Madras Government to ascertain the amount of sugar and jaggery manufactured in the Presidency from material other than sugar-cane. Jaggery (raw sugar) is produced from palmyra, sago, date, and coconut palms; but there is a consensus of opinion that it is not feasible to prepare any estimates of out-turn, whilst to arrive at any approximate idea of the area occupied by these sources of jaggery from year to year is not possible, owing to the fact that the trees are scattered and promiscuously planted.—*Madras Mail*, March 14.

GRAPHITE FROM CEYLON.—More concessions for digging for graphite on Crown lands were granted last year than in any previous year, notwithstanding the drop in prices. The district of Kurunegala, to the north-west of Kandy, has 154 graphite mines. In the southern part of the island 117 acres of land on which graphite had been discovered were leased for ten years for 333,450 rupees. In the central districts of Ceylon 112 mining concessions have been accorded. Since European firms have taken up the development of graphite deposits more scientific methods are employed in the working of the mines, and the ratio of production has been increased accordingly. —*Newsagent*, Feb. 23.

MANURING BANANAS.—Mr. R H Elworthy, of Priestman's River, took five acres of his coast lands in Portland, red soil which, he states does not grow bananas; he manured one acre with sheep manure, and on this acre the bananas made luxuriant growth and came in earliest, but bore small bunches of seven and eight hands. On one acre, rotten coconut husks were dug in and here the fruit came slow, with less stem and head growth than the acre with sheep manure, but the bunches were larger and fairly good on the whole On the remaining three acres no manure was applied and the bananas grew very poorly, producing when they produced fruit at all, small bunches and poor fruit.—*Journal of the Jamaica Agricultural Society*, Feb. 1901.

INDIAN TEA COMPANIES.—During the week a number of tea companies have published their reports—says the Calcutta Correspondent of *The Pioneer*, writing on March 29th. Reading the reports as a whole one carries away the impression that the results are not so bad as might have been expected, considering all the outcry that there has been and that the cry of "stinking fish" that has been raised over the industry is perhaps a trifle premature. Even although no profit may have been earned, and although most of the companies are unable to declare a dividend, yet the losses are small; and bad as prices have been, there is a ray of light in the fact that those companies, I take Dehing as an example, that have devoted their energies to making the better class of teas, have obtained a better average price than during last year, and even where low grade teas are manufactured, as in the case of the South Cachar Co., it is possible by capable management and a sufficiently large outturn to obtain remunerative results. Taking this last company, which declares a dividend at the rate of 10 per cent per annum, its successful results are doubtless due to good management, combined with the fact that it is able to turn out about 14 maunds of tea per acre as compared with an average outturn of about 5½ to 6 maunds in other Cachar gardens.

THE LINDOOLA TEA COMPANY, LIMITED.

REPORT.—To be presented at the Fourth Annual General meeting of the Lindoola Tea Company, Limited, to be held at the Offices of the Company, 12, Fenchurch Street, London, E.C., on Monday, 1st April, 1901, at 2 o'clock p.m.

The Directors have the pleasure to submit the Balance Sheet and Accounts of the Company for the year ending 31st December, 1900, duly audited.

It is with the deepest regret that the Directors record the great loss that the Company has sustained through the death of Mr. Walter Sandys Thomas, the Ceylon Manager, which occurred soon after his arrival in England on well-earned furlough.

The result of the year's working may be considered satisfactory, and is very similar to that obtained in 1899. The crop amounted to 185,634 lb. Tea, being at the rate of 580 lb. per acre, against 189,020 lb. last year. The cost free on board at Colombo was 25·11 cents per lb against 24·78 cents, and the gross average price of the 174,820 lb sold in London was 8½d, the same as in the previous season.

Drafts were negotiated at 1/4 9-32d against 1/4 19-64d last year. The current season's crop is estimated at 185,000 lb Tea.

The Net Profit for the year amounts to ..	£2,190 19 7	
And the Balance from last year to ...	153 19 11	
Making a total of ...		..£2,344 19 6
The Directors have already paid out of this dividends on the 6 per cent Prefereuce Shares for the year ending 31st December, 1900 ...	£780 0 0	
Interim Dividend on the Ordinary Shares of 2 per cent free of Income Tax ...	520 0 0	
Income Tax	47 18 8	
And it is proposed:—To pay a Dividend of 3 per cent free of Income Tax on the Ordinary Shares, making 5 per cent for the year	780 0 0	
And to carry forward the Balance of	217 0 10	
		£2,344 19 6

The sum of about £150 expended on new machinery having been charged against Revenue, the Directors do not consider it necessary to write off a specific sum for depreciation.

The Director retiring on this occasion is Mr. Walter Cross-Buchanan, and, being eligible, he offers himself for re-election.

The Auditor, Mr. J Hamilton Alston, also offers himself for re-election. By Order of the Board,

ROBERTSON, BOIS & Co., Agents and Secretaries.

London, 19th March, 1901.

THE BATTALGALLA ESTATE CO., LTD.

Eleventh annual report to the shareholders.

The Directors, in presenting their annual report on the working of the Company's business for the past year, are pleased to be able to give again a generally satisfactory account.

The increased production has necessitated a considerable outlay for new machinery, but the factory is now thoroughly equipped to cope with the larger output, and no further expenditure is likely to be incurred under this head for some years to come.

The quantity manufactured shows a considerable increase on the past year, totalling 274,556lb, against 224,803lb in 1899. The average selling price in London has been 8·38d per lb, against 8·43d in 1899, and in Colombo 36 cents, against 37·04 cents in 1899. The total crop averaged a selling price of 7·85d, against 8·22d last year.

London sales were 169,285lb, netting £5,128 12s 1d, and Colombo sales 104,925lb, realising R37,737·95. This compares with 191,350lb, netting £5,835 7s, and 32,600lb, realising R12,075·20 in 1899 in London and Colombo respectively.

Exchange for drafts has averaged 1s 4 7-16d, against 1s 4 13-32d in the preceding year.

An interim dividend of 5 per cent on the shares, free of income tax, was paid in September last, and there is now a balance at credit of profit and loss account of £766 14s 1d, from which the Directors propose to pay a further dividend of 5 per cent, free of income tax, absorbing £750, and to carry forward £16 4s 1d.

In accordance with the Articles of Association, Mr. C A Reiss retires by rotation, and, being eligible, offers himself for re-election.

The Directors are very sensible of the services rendered to the Company by their estate Superintendent, Mr. G C R Norman, who has handled a very large crop with unceasing attention and efficiency. In tendering him and his assistants their very best thanks, the Directors desire also to express their appreciation of the valuable services rendered to the Company by their Colombo Agents, Messrs. E Benham & Co.

50 and 51, Lime Street, London, E.C., 18th Mar. 1901.

THE PANAWAL TEA COMPANY, LIMITED.

The report of the directors for the year ending December 31, 1900, states that the net amount at credit of profit and loss account, including balance brought forward at December 31, 1899, after providing for general expenses, directors and auditors' fees was £1,577 12s, dividends on the 7 per cent cumulative preference shares were paid for 1900 in full amounting to £371, an interim dividend of 2 per cent on the ordinary shares was paid on November 10, 1900, amounting to £340. It is proposed to pay a final dividend of 2 per cent on the ordinary shares for the year ending December 31, 1900, making a distribution for the year 4 per cent, free of income-tax, which will absorb £340, to increase the reserve funds to a total of £1,720, by the addition of a sum of £505 19s 6d, leaving a balance to be carried forward to next season of £20 12s 6d. The directors recommend the distribution of a final dividend at the rate of 2 per cent on the ordinary shares of the company for the year ending December 31, 1900, making with the interim dividend paid to June 30, a distribution at the rate of 4 per cent for the year. The directors having in view the very unsatisfactory state of the tea-growing industry, consider it advisable to recommend the shareholders to strengthen the reserve funds. No alteration has taken place during the last twelve months in the acreage of the company's properties, which stand at: On December 31 last, tea in full bearing 590 acres; jungle, 341½ acres; total, 931½ acres. The directors consider that the shareholders have every reason to be satisfied with the result of the year's working. The crop realised for 1900 was 339,550 lb as against an estimate of 316,000lb. The yield in 1899 was 334,922lb. The visiting agent (Mr Melville White) before his departure from Ceylon, reported the properties as being in every way in excellent order at the date of his last inspection.—*Home and Colonial Mail*, March 29.

THE TALAWAKELLE ESTATES CO.; LTD.

REPORT.—To be presented at the third ordinary annual general meeting of the Company, to be held at the Office of the Company, on Wednesday, the 3rd April 1901, at three o'clock p.m.

The Directors have the pleasure to submit the balance sheet and accounts of the Company for the year ending 31st December, 1900, duly audited.

The mortgage has been reduced to £17,000, by the payment of the third instalment of £1,500 on the 31st December last, which has been charged against the profit of the year.

From the statement at foot giving particulars of the past year's working, as compared with the previous two seasons, it will be seen that, while the yield and cost of production remain practically the same, the gross average price of the Tea sold in London on account of last season was the highest recorded, viz., 11·21d., there having been a good market for Teas combining strength and quality.

The Expenditure on new clearings, about £330, is charged against Revenue.

Statement shewing results of working for the three years ending 31st March, 1900:—

Season.	Acreage Plucked. Acres.	Total Tea Crop. lb.	Yield per Acre. lb.	Sold in London lb.	Gross Average per lb. Tea sold in London. d.	Cost of Crop per lb. f.o.b. Colombo. cents.	Average Rate of Exchange per Rupee. s. d.
1898	802	421,284	525	418,565	10·57	27½	1/4 3-16th
1899	802	419,544	523	419,110	10·23	27	1/4 5-16th
1900	802	419,632	523	417,978	11·21	27½	1/4 9-32th

The net profit for the year amounted to	£8,310 3 4	
To which has to be added interest	76 16 8	
And the balance from last year of	563 16 1	
		£8,950 16 1
Interest on the mortgage for the year has been paid, amounting to	£905 14 7	
The third instalment of the mortgage of £21,500 has been paid, viz.	1,500 0 0	
Dividend on the 6 per cent. Preference shares for the year *less* income tax, has been paid	314 17 6	
An interim dividend of 5 per cent., free of income tax, on the ordinary shares was paid on the 30th September	1,853 10 0	
Income tax .	256 7 4	
It is proposed—To pay a final dividend of 10 per cent. on the ordinary shares, free of income tax. making 15 per cent. for the year, which will require	3,707 0 0	
And to carry forward the balance of	413 6 8	
		£8,950 16 1

The Directors desire to place on record their appreciation of the efficient management of the estates by their Superintendent and his staff.

The Director retiring on this occasion is Mr. Charles Murray Robertson, and he being eligible offers himself for re-election.—By order of the Board

ROBERTSON, BOIS & CO.,
Agents and Secretaries.

Schedule of the Company's Estates.

Estates.	Tea in bearing.	Tea not in bearing.	Forest and Timber.	Grass Land, Buildings, &c.	Approximate Total. Acres.
Talawakelle	(*a*) 302	12	(*b*) 69	(*c*) 22	405
Nanuoya ..	250	..	3	9	262
Katookella .	250	30	..	8	288
Total ..	802	42	72	39	955

(*a*) 3 acres leased from the Proprietors of the Boutiques.
(*b*) 25 acres felled.
(*c*) 2 acres leased to Messrs. Davidson & Browne.

HIGHLAND TEA COMPANY OF CEYLON, LIMITED.

Report of the Board of Directors, to be presented to the Shareholders at their fifth annual ordinary meeting to be held at the office of the Company, 16, Philpot Lane, London, E.C., on Tuesday, 16th April, 1901 at 3 o'clock p.m. The report of the directors for the year ended December 31st last states that the net profits have amounted to £2,438 19s 10d to which has to be added a balance of £86 10s 5d brought forward from previous accounts, giving a total to be dealt with of £2,525 10s 3d. An interim dividend of 3 per cent, (free of Income Tax) paid in September, 1900, absorbed £960, and it is now proposed to pay a final dividend of 3 per cent., free of income-tax, making 6 per cent. for the year, amounting to £960, and to write off estates account £500, leaving a balance to carry forward of £105 10s 3d. The profits shown by above figures fall somewhat short of those earned for the previous year, but, in view of the period of severe depression through which the tea industry has been passing, the directors think the shareholders are to be congratulated on the results attained. The total crop of tea produced by the Company's estates was 262,510 lb, against 259,233 lb in 1899, showing an increase of 3,277 lb; the average yield per acre all over was 448 lb, against 443 lb. and the average price realised in London was 8d per pound, against 8½d per pound. With regard to exchange, the directors issued instructions early in the year that the drafts against estate expenditure were to be drawn at a shorter usance than formerly, and the result of this course is a reduction in the rate of exchange from 1s 4 25-64d to to 1s 4 19-64d per rupee, by which some saving has been effected. The reports from the company's properties continue to be of a satisfactory character.

A POSSIBLE PARADISE: CYPRUS.

Reporting upon the condition of Cyprus for the past year, Sir W F Haynes Smith, High Commissioner, says:—

"The climate is exceedingly good, and the southern or Troodos range of mountains affords an excellent summer sanatorium. During five months of the year the top of the Troodos range is covered with snow, and a sanatorium might be established in its bright and clear air, which, even in winter, would afford a better climate than can be found anywhere else on the shores of the Mediterranean. A cool temperature would be obtained in summer, and a bright and warm sun enjoyed in winter on the crisp snow as in Switzerland.

"The irrigation works which are being constructed from the loan of £60,000 granted by the Imperial Parliament have been continued and have made good progress. Every one who has seen the magic effect of water on the cultivation in Cyprus must watch this experiment in irrigation with keen interest and with hope for its complete success.

"The Cypriot peasant lives for a very small sum on bread, olives, oil, raisins, vegetables, and wine, the products of the country, using little meat and buying tobacco at a low price. His clothing is, to a large extent, home made from the cotton grown in the country and from the produce of his flocks. The cost of living to Europeans is moderate, but the tendency is to increase.

"There are favourable openings for the investment of capital in the establishment of central wine factories and in further developing the silk industry. Silk of a high quality can be produced. There, is, I believe, also a profitable opening for capital in developing the sponge fisheries, and the Government is now in a position to afford advantageous terms to any undertaking having adequate capital to work the sponge beds of Cyprus under proper regulations.

'A land bank or an agricultural bank working under a carefully-considered system could employ capital to yield a remunerative return, and such an institution is much wanted, as the usurious rates of interest now exacted for advances to the producers are a heavy weight on the industry of the island."—*Daily Telegraph*, March 21.

GEOLOGY AND MINERALOGY OF CEYLON.

We take the following extract from an interesting review in *Nature* of work done under "The Tamnau Mineralogical Endowment," by Dr. F. Grünling, the well-known Assistant of Professor Groth of Strasburg:—

The thirty-third volume of Groth's *Zeitschrift fur Krystallographie und Mineralogie* is almost entirely occupied by the scientific work done upon the material which was brought back from Ceylon, and those who wish to see the excellent results of a wise scientific endowment wisely administered cannot do better than glance over this publication. Dr. Grünling brought back rich collections, especially of the dolomite and the minerals which it contains, of the graphite and of the gemstones; among the latter the most remarkable are the tourmalines, which constitute a unique series of beautiful crystals.

All these minerals have now been examined by various workers in Prof. Groth's laboratory. The graphite has been the subject of exhaustive study by Dr. Weinschenk, the lecturer on petrology in the University of Munich, who has already published papers on the subject in the *Zeitsehrift fur Praktische Geologie* and in the *Abhandlungen* of the Bavarian Academy of Sciences. The dolomite has been analysed by Dr. Schiffer, whose results have been given as an inaugural dissertation. And now has appeared this triple Heft of Groth's *Zeitschrift*, containing a general description of Ceylon and its minerals by Dr. Grünling, a research upon the chrysoberyl, the sillimanite and the blue spinel by Dr. Melczer, and a voluminous report upon the tourmaline crystals by Dr. Worobieff, whose memoir occupies nearly 200 pages, and is in reality a crystallographic monograph of the mineral.

The fact that so much has been achieved will suggest to the reader that the collection and scientific study of Ceylon minerals has been sadly neglected by our own countrymen. A perusal of Dr. Grünling's paper serves but to strengthen this conviction. With the exception of an interesting paper on the graphite and rocks of Ceylon, contributed last June to the Geological Society of London by Mr Coomara-Swamy, but published too late to be alluded to by Dr Grunling, little has been done. Mr Coomara-Swamy himself remarks, "No geological survey is in progress in Ceylon; it is much to be hoped that the Government will soon realise the importance of instituting one."

To give a very brief survey of the scientific results:—

Dr Grünling makes it clear that the graphite always occurs in typical symmetrical veins, though these have been much crushed and altered by earth movements which have spent their energy upon the soft graphite, and have consequently spared the country rock (granulite). Dr Weinsschenk comes to the conclusion that the graphite is of volcanic, and certainly not of organic, origin, and is probably due to the action of vapours containing carbon; he suggests that carbon dioxide and cyanogen compounds have played the chief part in its production. Among the associated minerals it is remarkable that, as at Passau, nontronite is one of the invariable decomposition products accompanying the graphite.

Dr Grünling is of opinion that the gemstones of the sands and gravels were derived from the dolomitic limestone which abounds in some parts of the island, for the spinel, which is certainly found in the limestone, contains sapphire, phlogopite, &c., while the corundum contains phlogopite, rutile and spinel. A granular marble from Wattegama, on the Kandy railroad, proves to be a theoretically pure *dolomite*; it contains, among other minerals, a remarkable blue apatite, which has been analysed by Dr Schiffer and is found to be a fluor-apatite containing 15 per cent of chlora-apatite. It is curious that Dr Grünling was unable to obtain any information concerning the original locality of the tourmalines; they are probably all derived from the cabook or laterite, and from some one place.

Worobieff's crystallographic measurements relate to 110 crystals remarkably rich in faces, and have resulted in the establishment of no less than 131 new forms? one crystal alone presented faces of fifty-nine forms; the table of calculated angles fills forty-three pages. He finds that the symmetry of tourmaline is undoubtedly ditrigonal, and not tetartohedral as has been supposed by some authors. The paper also contains numerous observations upon the pyro-electric properties of tourmaline, and distinguishes between the faces of the analogous and of the antologous poles.

Dr. Melczer's paper establishes beyond doubt that the chrysoberyls of Ceylon, of Brazil and of the Urals (Alexandrite) possess the same axes, and that the twinning takes place parallel to (031), not to (011). His optical study of the spinel leads him to the conclusion that the refractive index of this mineral varies with the colour; it is least in the most highly coloured parts.

The whole series of investigations reflects much credit upon the administration of the Tamnau fund, upon those who have collected and studied the minerals, and upon Prof. Groth, in whose laboratory the investigations have been successfully carried out.

The next award of this useful fund will be expected with interest. H. A. MIERS.

RUBBER FROM CEARA TREES.—Mr. F. E. Tringham brings us a very clean, superior sample of rubber, the result of tapping a single Ceara tree—four to five years old—on Pen-y-lan, Dolosbage. Trees giving so much for four hours' tapping are worth looking after and planting should be extended.

Correspondence.

To the Editor.

"REH" AND IRRIGATED LAND.

Paris, March 1.

SIR,—A letter of "A. D." (p. 542) in your *Tropical Agriculturist* for February, 1901, informs me that you have ("du saland") *reh* in Ceylon. In that case you would do well to ask M. C W Hilgard, Director of the Agricultural Experimental Station, at Berkeley, California, to send you his last memoir on this question, and you might give a translation of it in the *Tropical Agriculturist.* The ideas of "A D" seem to me right. Will you also have some specimens sent to M. Hilgard? He will be happy to analyse them. Cordially yours,

J VELBOUCHEVITCH.

[We suppose M. Hilgard's memoir, if for use in California, must be in English? Perhaps our correspondent "A D" (in the Tangalla district) will send us a few specimens of what he called "reh" to have transmitted to M. Hilgard.—ED. *T.A.*]

RUBBER EXTRACTION FROM BARK.

Paris, 2nd March, 1901.

DEAR SIR,—The process of extraction of the rubber from the bark is making very quick progress. Ten years ago nobody was thinking about it. Today we have a few reports on the opportuneness of such a process. You know that many plants are exploited by the cutting of the stem, what you call I believe peeling the tree; such are many roots, and slow growers such as *Mascarenhasia* and others from Madagascar, *Landolphia Hendelotii* from Soudan, and a lot of roots primitively neglected because it was quite out of practice to tap them by the common process.

Some were cut in pieces and put to bleed into recipients, as is done with *Urceolo*; but all the sap remaining in the bark after the operation was lost for ever. Now you can obtain from that neglected bark more rubber than the quantity obtained from the latex; and I know people asking for our process, intending to use it for the neglected barks left by the natives on the spot.

If it is true in the countries where the natives are accustomed to tap the vines, how much more in the regions where the collector must make the education of the collector of rubber, what can be the colour of his skin? If *par-dessus le marché*,* I cannot translate this French locution, the Governor of the colony has promulgated laws for the regulation of collecting the rubber, avoiding the cutting of the vines, stating that they must be tapped in official mode; when these vines are so long, so old, so large, the collector thinks that the weather is too bad for working and he sleeps till better times. But if you can say to the collector: go and cut the vines, but bring me the rubber you have obtained and if it is too meticulous [timid !] for you, bring me the bark, the white, yellow, black or undetermined,—the coloured man will think that to cut the vines is a very pleasant work for him and the crop of the bark a very pleasant one for his wife and he will go to work at once.

* *i.e.* If the labour is too expensive.—ED. *T.A.*

If it is true for the collecting of the bark, how much more it is for the *enrichissement* *—another word I cannot manage—of this bark.

The *Landolphia Hendelotii* per oz. contains from 7 per cent to 1 per cent of pure rubber. When the bark is dried quickly,—and I say quickly because when the operation is done slowly the fermentation is a cause of loss of the gum,—this bark is easily broken in a mortar, a common one for the decortication of paddy; so after a few minutes the operator can separate a few per cent of the impurities, and as generally native women are expert in the manipulation of the pestle, their lords and masters have no hesitation in entrusting them to perfect this work.

I have received bark of better rubber prepared by the female beauties of Senegal, containing no more than 20 per cent of impurities. Such rubber is a very commercial one and will be accepted on any market.

It is naturally much more difficult to bring this rubber to purity, but we must not be too exacting and such rubber will lead the way in the manufacture of pure rubber. With patience it is possible to obtain nearly pure rubber by these primitive processes; but the buyer is judge of the question; he can pay the rubber on the percentage and the analysis is quite mechanical. If the buyer take one ounce of the product and use an iron mortar and pestle and take the formation of nature; after a few minutes, if he has had the precaution of wetting the bark, he will extract a certain proportion of impurities and obtain a parcel of rubber nearly pure and a sufficient sample for judging the quality and the quantity of good rubber in the sample. After a very short time he will be able to avoid any mistake.

The extraction of rubber from the bark gives better product than the bleeding:—I send you a little sample of Borneo rubber obtained two years ago, and you will see that it is much better than the rubber generally offered on the market from this country. It has been prepared by a collector using this process for the first time. It is enough for today.—Believe me, yours truly,

A. GODEFROY-LEBEUF.

* Improvement of the bark.—ED. *T.A.*

COFFEE AND ITS ENEMIES IN B.C. AFRICA.

[BY AN OLD CEYLON PLANTER.]

DEAR SIR,—I send you a paper which I penned about 18 months ago, relating to the difficulties we have to contend with in B C A. in regard to the many enemies of our staple industry, coffee planting.

To these enemies we have now to add the spotted bug. This little pest is very like a lady-bird and, unlike all the Ceylon coffee bugs, flies about from tree to tree sucking at the juice of the flower, fruit and tender shoots or buds as they appear on the coffee trees. The damage done to the flower is terrible, completely destroying the fructifying power even in the most favourable weather. In regard to the fruit the insect sucks the juice, and seems to inject poison into the berry when young which turns it black or spotted or streaky, so that the fruit withers up and drops off the trees, even when it reaches the size of peas, just the same as the leaf disease

affected the Ceylon crops leaving only small clusters or single berries to come forward to maturity and those berries that do reach that stage are mostly damaged.

The buds or terminal branches when sucked at, turn a dark green colour and are stunted or bastard, having a shrivelled-up appearance with a black pith and black spots shewing between the bark and the wood.

The damage alluded to is worst during the dry season when there is very little sap in our coffee trees, and does not shew much during the growing or rainy season. I lost a fine crop about 6 cwts per acre this year with this bug. They came before the bush fires in swarms and found a safe harbour amongst my coffee. In addition to the new arrivals, those that had come in, and bred amongst the coffee for some two years unheeded (I was not aware they did any damage) added to the damage done. To show you what a number of bugs I have gathered, I have had an average of 20 children at work collecting daily for the past 6 months and they have each brought in from 30 to 60 per diem. Thank goodness, they can only get a few, 3 to 5 each, now. So that I may get a bumper crop next year. It was always next year in Ceylon, I remember, during the leaf disease days. It is now quite certain in B C A that we cannot rear bug. and get coffee to yield crop. It is very fortunate however that we have a remedy, although a tedious one, in catching the spotted bug I was always looth to believe that our spotted bug did damage to coffee before I proved it by experiments.

I have further proof this year by the fact that my crop is saved on the pieces of coffee where there is a colony of soldier-ants established; this tiger-ant eternally racing about on the coffee keeps the bug lively, not allowing them to rest and do damage, even if they don't succeed in catching them, which they sometimes do, and of course the ants pull the little wretch to pieces and devour it at once. I am going to set a boy on with a piece of meat on the end of a stick to trap a party of ants and distribute them about the plantation to help to fight the bug and other insect pests. I remember, I think, doing the same with red ants in Ceylon, to try and get rid of helopeltis or some other pests on my cacao in Matale.

Our red ant seems to be identical with the Ceylon one, that used to torment the coolies so when handling, where they established themselves and made nests amongst the coffee leaves. Only they don't seem to bite so hard, or it may be the African negro has a thicker hide.

I am growing tobacco for which I can get 1s 3d per lb. for clean in South Africa. Tea I may turn to good account by-and-bye also in South Africa. Chillies pay very well here, I have been getting up to 55s 6d lately for them. You in Ceylon seem to be having a hard struggle for it with tea; low prices and exchange must alter, otherwise it will prove serious for proprietary planters, although companies may not feel it so much. You can never stop rubbishy tea getting into your markets. People who want cheap tea or rubbish will and must have it, the same as rubbishy coffee, tobacco, &c. H. B.

[Our correspondent's longer essay will be given in the *Tropical Agriculturist*. Let him send specimens of his new "poochie" for Mr. E. E. Green's report.—ED. *T.A.*]

HOW TO DEAL WITH INFERIOR TEAS.

AN IMPORTANT SUGGESTION.

March 20.

SIR,—It would perhaps save a good deal of very inferior tea coming on to the market if the Tea Brokers in Colombo put an upset price on all tea of say eighteen cents, for the sake of a figure, and refused to sell any privately or publicly under that price. This would ensure at any rate in Colombo the destruction of most red leaf, mixed, and general rubbish, and it would not pay any one to send such stuff to England or Australia probably. If the Brokers did not care on their own initiative to take the step, they would do so if a resolution of the Planters' Association and the Chamber of Commerce were passed, asking them to institute this rule. Any Broker, after such a resolution, contravening the agreement would be boycotted, so there would be no fear of any lapses from the path of virtue.

The Broker would perhaps lose some commissions, but after all they are very small on the prices realized by such common rubbish. And the improved prices we trust to get would much more than recoup them afterwards. If, what is sincerely to be trusted, with all the finer plucking etc., we do get the prices of tea up, the danger will be the severe warning we have had will be forgotten, and a return made to the old system of coarse plucking, with consequent collapse again. The "Thirty Committee" might add to their duties that of advising the Planters if more or less leaf should be produced. If tea were being forced too high, it would be good policy to pluck coarser to prevent competition from outside, and large extensions. The Thirty Committee should have their fingers on the pulse of the market and advise accordingly.

It is an exceeding pity the question of the reduction or total abolition of the tea duty was not brought forward by a stronger debater, and properly threshed out once for all. If Mr. Christie, for instance, believed in the advisability of the step and brought forward a motion, no fear of the weight of his adversary's mettle would deter him from doing the utmost justice to his side of the question.

Very possibly there are insuperable objections, but they have not been brought forward publicly so far, *pace* Mr. Harcourt Skrine.

In its favour we have for certain the increase of buyers, of business generally, and Ceylon teas compete with the advantage of being *in situ* and, therefore, *per se* worth to a buyer their value plus certainly ⅞ of cost of transit of foreign teas. That is say it costs, say, 5 cents to deliver a 6d China tea into the blending house; it would be worth a buyer's while to pay 6d plus 4 cents for an identical Ceylon tea. The grower of the latter would gain 4 cents extra and the buyer save one. Under such circumstances can there be any doubt Ceylon tea both high and low grown would be used for preference wherever possible to our profit.

To a lowcountry proprietor especially, the total abolition of the duty seems most desirable. If some small duty is considered necessary, Ceylon tea would also, being free of it, get the extra value of that also.

Surely anyhow the question is worthy of a proper debate. LOWCOUNTRY.

CACAO:

Cultivation v. Longevity.

DEAR SIR,—There is no question, I take it, that the cultivation of cacao, if carried on at all, should be done more or less in co-operation with the tree itself.

I may be pardoned this platitude on account of the number of planters who appear to forget in their treatment of it that cacao is one of the most delicate of fruit trees; and this is manifest in numerous ways, but in two ways very specially, namely (a) the condition of Suckering, and (b) the condition of Manuring. I think I see in these two conditions of treatment, as applied to cacao in Ceylon, something of the conditions under which coffee was grown to the comparative disadvantage of the former. In this connection also, I may venture to indicate a parallel between the leaf fungus of coffee, and the bark-fungus of cacao: that, as some have thought the coffee-fungus may be traced, however indirectly, to drastic manuring, so the cacao-fungus may perhaps be traced to the accumulation of damp litter; the point of the analogy being that both improper manuring and excess of litter induce *dirt*, and hence ill-health in the tree. Analysis of the soil, and sometimes of the tree itself are resorted to for purposes of discovering if possible what natural constituents of life are respectively lacking and present: chemical analysis therefore tells us what to manure with; but practical analysis, *i.e.* knowledge of the tree and its nature, is also required before any manure should be applied. The just combination and intelligent application of these two methods constitute the scientific lines on which a product should be cultivated.

But, although the object of manuring coffee and cacao is identical, namely, the production of fruit, it by no means follows that the system of manuring as applied to coffee is applied with equal benefit to cacao, irrespective of whether cacao will stand the treatment. On the other hand cacao is a delicate plant, more delicate certainly than coffee, and should consequently be treated more leniently—within certain prescribed limits; and these limits have direct reference not so much to the method of treatment as to the actual life of the tree.

If the natural quantity of fruit borne by a tree is insufficient to render its cultivation remunerative, the tree must be forced. This is undoubtedly the case with cacao; for a cacao tree allowed to grow at its own sweet will does not bear soon enough for impatient mortals. Quick returns first—then large profits: it can be done, but it is done at a cost; and that cost, I hazard the opinion, is *canker*—not the only cost, but the greatest, I believe.

This question of manure, too, is all the more important owing to the extremely unnatural conditions under which the cacao tree is alone speedily remunerative. I shall never believe that the tree's original nature is to throw up '*suckers*.' What the tree does throw up in the first instance is not a 'sucker'—not a 'gormandiser'; *it is the tree itself.* To cut this off is *to top the tree*; and the proof of this is that, if the so-called 'sucker' is allowed to grow, it in turn spreads out in another platform, and a little later another so-called 'sucker' grows up and forms a third platform, and so until five, six, seven platforms may successively be reached. It is true that, whatever that first 'shoot' is called, it has to come off if crop is the objective; but I have done something more than say the same thing in other words. I have made it clear (if indeed it was necessary) that the conditions under which a cacao tree is cultivated in Ceylon are at least as unnatural as those under which coffee was grown; and, if it is admitted that cacao is more delicate than coffee, it will be seen that this only increases the disability under which cacao necessarily labours.

Weakness in a cacao tree is dependent upon many things; but three especially, namely,—soil, climate, treatment. The tree may fail, early or late, but it is bound to go in the long-run. It has neither the longevity nor the vitality of tea; but trees in a natural uncultivated state have been known to live—I write under correction—fifty and sixty years, and perhaps longer; and such trees are in the Island. Now, the oldest trees in the Island are Caraccas, but what Superintendent can point to a thirty-year-old Caraccas field and believe it good for another twenty-years at 3 cwt. per acre? It is said that "Cacao Walks" of the West Indies have been handed down from father to son for generations; but it has never been urged, I believe, that the original trees are still living. The soil of the West Indies is infinitely finer on the whole than our average Ceylon soil, but soil is no guarantee of longevity any more than is the air we breathe. Bad air poisons us, but good air is not, conversely, *elixir vitæ*, but a natural food; and similarly good soil to the cacao tree is a sustainer of life in proportion to the quantity of it consumed and the method of consumption. The first indication of this weakness therefore may appear early or late, according to the absence or presence of certain necessary conditions. A time comes when the tree, worried by suckering and fatigued by bearing, fails; then is the time to manure. Coffee was manured by cutting half-moon trenches about the tree. Shall the same be done for cacao and in the same way? If we scrape away an inch or two of soil around the base of the tree we come upon a very network of fine silky roots. Not everyone knows that these are the *fruit-roots*. Shall we cut them through with our half-moon trenches, first on one side the first year and then on the other side the following year? It was so done to coffee. But cacao is more delicate than coffee; surely, therefore, such drastic treatment should not be entered upon without sufficient reason. Where is the reason then? Is it to be found in root-pruning? The ruthless cutting through of the roots, upon which we depend for one crop, can scarcely be called that. This root-amputating, fibre-smashing, crop-obliterating treatment is not root-pruning. What other reason, then, for this extraordinary manner of application? Is it hallowed by habit, or cursed by custom? At any rate, the fruit-roots being all on the surface, it is folly to dig for them! Uncover, sprinkle the manure over, cover them up again, and the thing is done cheaper, because quicker; better, because all indiscriminating amputation is avoided. And we need to manure because the trees would otherwise grow weak—nay, they grow weak in any case—slowly, gradually weaker; the object of manuring being to delay this natural process, the common miracle of decease, and to let the tree—and the proprietor—down lightly.

Ever since the tree was topped, it has done all it knew to follow its own bent. For every 'shoot' pulled off, it has put up two, four, six, until new

'shoots' have been forced out of the hard trunk-bark anywhere and everywhere. But of these it has been deprived, and every shoot or 'sucker' so pulled off has had its certain effect on the nature of the tree; and the energy of the tree, expended in frustrated efforts to grow to its normal height, has been transformed, according to certain natural laws, with development of its laterals. But these laterals have developed slower than the energy was stored, and this stored energy therefore has been transformed into the extra crop we needed. In other words the tree has gradually been degenerated into a perennial condition of reproduction—considered a condition of high culture in many plants, and some animals. But prevention is better than cure, and, long before the tree reaches this prematurely senile period, such steps should, to my mind, be taken to prevent it ever arriving at it.

A tree once afflicted is, if nothing else, a source of infection: and it is a question whether more harm is not done trying to pick out all the 'borers' (the small 'borers' are ineradicable) and cutting out the canker than by felling the tree 'root and branch,' then and there. Perhaps it may be preferable to lose the tree, especially if we have already a plant close by, just beginning to bear. Then the loss is nil—a gain in fact, for we have a new tree for an old tree, youth for age. What, I ask, is to prevent us deliberately re-planting the whole estate, say, every fifteen to twenty years and cutting out the old cacao, either *en masse* or tree by tree if we prefer it? The expense is not great, and if canker can be avoided by the simple contrivance of not permitting the cacao to reach that age when, in the opinion of many practical planters, it becomes more liable to it, the better procedure is obvious. For nothing can be worse than canker.

We should then have a clean bill of health, a brand new estate (bearing proportionately to our own foresight) and essentially a new lease of life.

POD.

PLANTING NOTES.

AGRICULTURE.—The whole of the splendid Dunga estate, with the exception of land selected for Vanilla, and experimental products, is now being planted with coconut and clove seedlings. The careful cultivation of cloves, with the aid of the plough for the last year or two, is now beginning to prove how much superior the plough is to the native hoe. The trees are much larger than they used to be, and are bearing heavily. Nurseries for clove and coconut seedlings are being rapidly prepared at different stations on the Island for a supply of seedlings to planters. —*Zanzibar Gazette*, March 20.

SOMALI AND TEA PRODUCTION.—While Indian and Ceylon planters are thinking out the best means to restrict the output of tea, Mr. Joseph Foulkes, an African explorer, tells us that the region traversed by the Juba river is an ideal tea-growing country, as the wild-growing tea plant is found there. There is reason to suppose that Jubaland may become in the not distant future a considerable rubber-producing territory also. Mr. Foulkes, who is now on his way *via* Mombasa to the Juba district in command of an expedition, will make an especial study of these two plants with the object of furthering, if possible, their cultivation in Jubaland. It is understood that he has considerable financial support, and should his surmises with regard to the possibilities of the country turn out to be correct, he will be in a position to at once commence arrangements for the transforming of the cultivable areas into rubber and tea plantations.

THE ORANGE TRADE OF COORG.—A Coorg correspondent writes to the *Madras Mail*:—"A good thing is being made out of oranges by traders from Mysore, who purchase a cartload of fruit at R10 or R15 and realise R30 to R35 for the same. Allowing the liberal sum of R8 for cart hire to Mysore, it will readily be perceived that a handsome margin of profit remains over. In view of the Railway being made through Coorg, oranges might be largely planted. The trees would probably come into bearing just when the iron horse reaches the country, ready to take away their burdens of golden fruit. Other fruit trees might also be planted, but it would have to be done on a sufficient scale to allow of measures being adopted for safeguarding the crops. In one case, I believe the cultivation of fruit as an auxiliary to coffee will be undertaken here next season."

RUBBER AND ITS EXTRACTION.—We are indebted to Mr. Godefroy-Lebeuf for another letter on this subject, and we trust he will continue to report to us the progress and improvements made in the extraction of rubber from the bark, branches and twigs of rubber-yielding trees. It is marvellous to us how well our correspondent expresses himself in English, and we hope he will continue to write in that language; but it might help us where difficult points come up, if he gave his sentence also in French, which might lead all the more quickly to the clearing up of any difficulty in the understanding of a particular phrase or scientific process. We sent some time ago a small bag of bark samples from a Ceylon rubber plantation to be tested; but the result was disappointing —indeed *nil*—showing that the trees were too young to yield rubber from their bark or branches. Our correspondent sends us now a sample of Borneo rubber prepared by the new process. It seems very satisfactory.

FRUIT FROM THE WEST INDIES.—The steamer "Port Morant" arrived at Avonmouth recently, fully laden with fruit, besides carrying thirty-five passengers and mails, being the first of the Imperial direct West India Mail line to make the return voyage from Jamaica to Bristol. The vessel had a stormy homeward trip. Interest centred in the condition of the Bananas which formed the main part of the cargo, 18,000 bunches being stored in bins, the temperature of which was regulated by air-currents. Mr. Robert Thomson, formerly head of the Jamaican Botanical Department, has been appointed adviser to Messrs. Elder, Dempster, & Co., owners of the line, with regard to the growing and packing of fruit, the appointment giving great satisfaction in Jamaica, where his scientific attainments are greatly appreciated. Bananas in various degrees of fulness were packed, so as to thoroughly test the appliances of the vessel, and all the fruit arrived in splendid condition. The London and Liverpool buyers, who had an opportunity of inspecting the bins, expressed gratification at the excellence and soundness of the fruit. The whole cargo was sold, mainly for London, Liverpool, Manchester, and Bristol markets. The vessel also brought a large consignment of Mangoes, Pineapples, and Oranges, all of which stood the voyage remarkably well, fully answering the expectations formed as to the capabilities of the line in developing new trade with the West Indies.—*Gardeners' Chronicle*, March 30.

POTATOES.—It takes from 12 cwt. to one ton of seed potatoes to plant out an acre, the quantity depending on whether small sets, large sets, or whole potatoes are used—*Journal of the Jamaica Agricultural Society.*

MANY OF THE COFFEE PLANTERS in Southern India are going in for rice cultivation, and consider it a useful, if not highly remunerative, supplementary crop. This is especially the case in the Malnad district of the Mysore province.—*Indian Agriculturist*, March 1.

A CORRECTION.—In case anyone may take the trouble to notice the mistake, I may note by the way that, in the report, quoted in *T.A.*, of my "Curiosities," &c., I am made to say *Gutta Percha* is found in the Amazon Valley. I never said so. It is merely one of the vagaries of the reporter. *Borneo*, &c., in the *East*, I said, was the home of the *Gutta Percha* and I think, I noted this on the margin of the paper sent.—*Old Colonist.*

AN INCH OF RAIN.—What does an inch of rain mean? Few persons have a definite idea. An acre if calculated out, will prove to be 6,272,640 square inches. An inch deep of water on this acre will be as many cubic inches of water, which, at 231 to the gallon, is equal to 27,154 gallons. This immense quantity of water will weigh 228,190 lb. or 114 tons. One hundredth of an inch (·01) alone is equal to over one ton of water to the acre. In forty-eight hours, during the month of January, 15½ inches of rain fell at Geraldton. This was equal to 420,837 gallons per acre or 1,767 tons, or about one-seventh of the total quantity required to irrigate a crop of sugar cane during the growing season.—*Queensland Agricultural Journal.*

BOTANIC GARDENS, NATAL.—The rainfall for the past year has been 13·20 inches below the average of the last twenty-eight years, the total for the year being 27·24 in. as against 88·03 in. the average rainfall at Colombo for 31 years. Many plants have died in the Gardens owing to the droughts. The climate has been found unsuitable (as shewn above) to the growth of cacao (*Theobroma cacao*) though it appears that the fruit of another tree called *Pachira alba* is sometimes mistaken in Natal for that of cacao. The climate seems well suited to the cultivation of pineapples, and a long extract is given on the question of manures for these. The gardens are supported by subscriptions and a Government grant.—*Cor.*

RUBBER AT MANAOS.—The Government of Amazonas has decreed a law that is now being carried into effect, and must, like all artificial restraints on trade, prove highly prejudicial to the real interests of the State itself. Designed to injure Para by depriving that city of the great transit trade in rubber, it is likely to react on the rubber industry itself, and give rise to a still further fall in prices. The advantage of concentrating the export trade at one centre, at Para, is evident, as competition was always certain to secure the best possible prices for producers. With two markets, the second at an enormous distance from the coast, and with uncertain telegraphic communication with foreign markets, competition by buyers is certain to suffer. The decree we refer to obliges all rubber from the State of Amazonas to be landed at Manaos, packed in cases, and reshipped at a special wharf under Government inspection.—*India-rubber Trades' Journal*, March 4th.

GREEN TEA MANUFACTURE.—Mr. Deane reports the following as using his machine in Ceylon:—

LIST OF CEYLON ESTATES USING DEANE'S PROCESS.

Brunswick Estate. (2)
C P Hayley, Esq.
E Rosling, Esq., (Chairman, Planters' Association).
Ceylon Tea Plantations Co.
Eastern Produce and Estates Co. (2)
Messrs. Geo. Steuart & Co. (2)
Lipton's Limited
Carolina Estates.
Darrawella Estate.
Messrs. Finlay, Muir & Co. (2)
Hardenhuish Estte.
Elkadua Estate.
The Hon. J N Campbell, M.L.C.
St. Leonard's Estate
Ratnatenne Estate.
Messrs. Whittall & Co.

CONIFERS AS RAIN GAUGES.—According to a recent number of the *Revue Horticole*, M. Felix Sabut has lately communicated to the Congrès des Sociétés Savantes observations respecting certain plants that act as registering rain gauges:—"Mention has already been made of the influence of certain more or less severe droughts in the French Mediterranean upon *Pinus Laricio* of Corsica, and Cephalonian Fir. The lengthening of the branches of these two species is always proportionate to the quantity of rain falling during those months of the year when it is most profitable to them. Co-efficients have been established indicating what the degree is for each month of the year. These co-efficients enable the relationship that exists between the amount of rain fallen and the greater or less intensity of the vegetation which it has encouraged to be determined. It is shown that, under these conditions, it is possible to judge approximately the quantity of rain which has fallen by measuring exactly the length of the leader, or of the branch produced yearly on these species of pine, and, if the estimate is not absolutely proportionate to the quantity of rain registered by the rain-gauge, it closely approaches to it; and a still closer estimation may be made by taking into account the relative value of the results produced by rain in the several months of the year. It is, therefore, possible, to a certain extent, to use plants specially selected for this purpose as actual registering rain-gauges."

THE CHEMISTRY OF SOIL.—"Undoubtedly one of the most wonderful discoveries of modern chemistry has to do with the soil," says the *Saturday Evening Post.* "It has been ascertained that the most barren land can be made rich simply by adding to it certain mineral elements which cost but little. On this basis it is estimated that the United States will be able eventually to maintain 500,000,000 people—more than one-third of the present population of the world. It is merely a question of supplying the requisite quantities of nitrogen, phosphoric acid and potash. The last two are readily obtainable at small expense, whereas the first may be supplied either by furnishing to the soil condensed nitrogen in the shape of slaughter waste, of nitrate of soda; or by planting clover, beans or peas, which have an affinity for nitrogen and absorb it from the atmosphere. It is now known that nitrogen is the most important plant food, and, inasmuch as this element composes four-fifths of the atmosphere, the question is merely to absorb it into the soil. It has also come to be understood that only 2 per cent. of the material of plants is derived from the soil, the remaining 98 per cent. being drawn from the air and from water.—*Bradstreet's*, Feb. 9.

FOREST ENGINEERING.

We have to acknowledge receipt from the author of a copy of "A Manualof Forest Engineering for India" by Charles Gilbert Rogers, Fellow of Cooper's Hill, Deputy Conservator of Forests, Imperial Forest Service of India—Volume I—Price Four Rupees, English Price Six Shillings. It is a very useful compilation of some 300 pages with over 140 illustrations, after the style of the well known Roorkee Treatises. From the preface we learn:—

This Manual has been written by order of the Government of India for the use of Forest Officers in India in the first instance, but will, it is hoped, prove of some practical value to the general public, and especially to that section of the community who are engaged directly in the management of tea and coffee gardens, indigo concerns, and in agricultural pursuits generally.

The Manual has been divided into the following parts:

Part I.—Building Materials.
Part II.—Building Construction.
Part III.—Road Making.
Part IV.—Bridges.
Part V.—Transport of Timber.
Part VI.—Wells.
Part VII.—Construction of Embankments and Water Channels. River Training Works.
Part VIII.—Demarcation of Forests.

Parts I and II will form the first, Parts III and IV the second, and Parts V to VIII the third and last, volume. The first two volumes contain information which will be useful to anyone who is interested in simple engineering problems, while the third volume contains those parts of the subject which are of more special interest to a Forest Officer.

Mr. Rogers has had the help of experts, in different departments, and the Manual as a whole cannot fail to be a very valuable one.

A SUCCESSFUL MATABELE HUNTER.

Mr. Phillip Stellwagen, the hunter, returned to Beira from Cheringoma and the Zambesia districts by the *Matabele*. During his absence from town he has shot big game which have yielded him about 7 tons of heads and horns, including many fine specimens and probably some records. One pair of buffalo horns, the pick of 42 shot, measures 52 inches from tip to tip, which must be almost a record for a cow. Mr Stellwagen has been very successful in his trips lately, and evidently works very hard on the veldt, and has a knowledge of a very pretty bit of hunting country which always yields good sport. He is also well spoken of by shooting parties to which he has been attached, as the guarantee of a good bag.—*Central African Times*, March 9.

SCIENTIFIC EXPERTS FOR INDIA.

TWO IMPORTANT APPOINTMENTS.

Planters, agriculturists, and gardeners in this country have reason to congratulate themselves on the attention now being given by the Government of India to the appointment of scientific experts. We have quite recently had a competent entomologist added to the staff of the Indian Museum. We have now to record the arrival at Calcutta of two other experts, viz., Mr. Isaac Henry Burkill, M.A., F.L.S., from the Royal Gardens, Kew, as Assistant Reporter on Economic Products to the Government of India, who has taken up his duties, and Dr. Butler as Cryptogamic Botanist for India. This gentleman arrived here last Friday from Ceylon, where he spent a short time on his way to Calcutta. He has now taken up his duties at the Royal Botanic Gardens, Calcutta, under Dr. Prain, the Superintendent. Dr Butler has worked under Professor Van Teighem at Paris on fungi, and under Mons Poivault at Antibes. Before he studied in France he was a pupil of Professor Hartog, at the University of Cork. The officers of our "Indian Agriculturist Bureau" scheme, sketched out in our issue of 8th December, 1898, are gradually being appointed, and we hope to see before long the formation of the Bureau *un fait accompli.—Indian Gardening and Planting*, April 11th.

CEYLON IN 1889 AND 1901.

(Return to Ceylon after an absence of twelve years of an old planting correspondent.)

ARRIVAL AT GALLE.

After a passage of 18 days in the "Clan Ross" from Natal, we sighted land on Good Friday and as the mist rolled away Adam's Peak was the leading feature. Being too late for entrance into Galle harbour we anchored within a cable's length of the Bell-Buoy and waited till daylight to come in.

There were a number of waterspouts around the ship, some of them very near us the day before we came in sight of lands.

The weather was good from the day we left South Africa and there were numerous flying-fish to be seen every day skimming the waves.

The late rains had brightened up all vegetation and Galle looked very beautiful as we entered the harbour. Clearing our baggage at the Customs, we (four passengers) made straight for the Railway Station, crossing the esplanade where a Cricket Match was in progress and a number of lookers-on in the grandstand. The Easter holidays seems to have commenced, to judge by the number of people travelling by train. We had never before journeyed by the sea-side railway and this was an agreeable change from the old Coach, keeping the sea in view through openings in the deep fringe of Coconut-palms. The railway trip to Kalutara South Station was very enjoyable. Kalutara is a lovely place with a very large and comfortable Resthouse. The servants there are very attentive, and a good breakfast prepared at short notice. We were not in want of much rest after a fortnight on board the steamer and took advantage of a break in the weather to drive out and see the tea estates of Kalutara. Driving is cheap here, especially the neat little bullock hackeries with hoods complete, the roads fairly good, and the tropical mass of vegetation lining the roadways most picturesque and romantic; almost every conceivable fruit tree and palm making lovely avenues and rendering grateful shade from the setting sun.

The climate of Kalutara islsomewhat trying to men o f advanced age; and the bungalows being perched on the elevated ridges, there are some stiff climbs to make before shelter is found.

We have already visited half-a-dozen thriving tea plantations in

KALUTARA DISTRICT;

and on Monday last had the good fortune to meet nearly all the planters of the district at a cricket match played between the K.C.C. and the M.C.C. There was some hitch about the first day and the match commenced and was finished on Tuesday the 9th instant and was a very interesting match, displaying good fielding and bowling.

In fact the contest between the gentlemen of Kalutara and Moratuwa was so keen and fierce that it was continued to the finish in a storm of heavy rain and only won by two wickets by the M.C.C.

The drive home was cool and pleasant and then another good climb in the dark to Glanrhos Bungalow, a warm bath and Pyjama Suit—good dinner and early to bed.

PRODUCTS.

The district of Kalutara is a huge tropical garden; everything flourishes: the jâk or artocarpus integrifolia, the breadfruit or artocarpus incista, with a broad-leafed artocarpus of the forest left as a shade tree intermingled with kittool and arecanut palms, coconut palms, cotton trees, acacias, lunumidella, and other useful and ornamental trees.

Rubber is largely cultivated and giving some returns; cloves, nutmegs and Liberian coffee are all doing well in Kalutara.

There is a new Papau introduced from the West Indies, a fruit which when stewed resembles the Californian pear.

Flowers are in great profusion: beautiful crotons equal to those seen in Colombo gardens; the Dracæna or Chinese palm, many handsome marantus and Bougainvilleas; the numerous shade trees, including the Grevillea, give the Kalutara estates the appearance of Botanical Gardens.

TEA.

The first tea estate visited was Clyde, a most compact and valuable property with large factory. Glanrhos managed by Mr. J P Dove is another valuable tea estate with a large miscellaneous cultivation suited to the climate. The jât of Assam hybrid in Kalutara is much better than I expected to find and some of the places we visited though rocky give very fair returns of tea leaf per acre.

Putupaula (including Crurie) managed by Mr. H A Tipple is a beautifully situated estate commanding a grand view of the Kaluganga River and Mountain Scenery including some of the highest mountains of the Central Province.

The carriage drive through the Neboda Group (including Digalla and Narthupane) was very narrow; we left the trap and horse at the factory and walked to Putupaula in a very hot sun and felt rather pumped by climbing the short cut to Mr. Tipple's bungalow, who kindly invited the writer to accompany Mr. Dove to visit him; we were rewarded by having several games of chess when the rain was falling heavily outside.

The picturesque scenery from this bungalow was well worth the hardship of the trudge to and from the carriage drive to the cart road and we felt all the better for the walk and drive back.

We passed a very comfortable bungalow or rather two-storeyed house with a windmill to pump water up the hill; this nicely situated residence belonged to Mr and Mrs Morrison away from Ceylon. We met Mr Heath at the factory returning to Glanrhos.

The Sinhalese holiday has commenced and a man got killed last night for stealing toddy. Plenty of Chinese crackers are going off in the villages below us this evening.

The weather still continues stormy, great heat during the day and heavy rains in the afternoon preventing me from exploring the district, especially as I have no horse and know so few people. I had thought of travelling across the low country to Avisawella and then through the Kelani Valley, but, after making enquiries about the tea estates and the planters of that district, I find that a new generation has sprung up, that knows not Joseph.

I had the pleasure of seeing the Duke and Duchess of York at the grand reception given to Lord Roberts in London and hope their visit to Ceylon has been a success H. COTTAM.

A CEYLON PLANTER ON TEA-GROWING IN RUSSIA:

MR. E P WILLISFORD TAKES CHARGE OF MR. POPOFF'S ESTATES NEAR BATOUM.

GREAT EXTENSIONS PLANNED—NOT PLEASANT READING.

We extract from a letter sent to our evening contemporary, dated 18th March last:—

Mr. Popoff owns three estates in the Caucasus, near Batoum: the principal one, Prevolnoyer, is where I live. It is about two miles' drive from Batoum—the hills, which are very similar to those in Ceylon, run down close to the sea—the house is situated on the top of the highest, overlooking a fort, and with the whole of Batoum and a long line of sea-coast to the north of it below. My interpreter lives with me, and there are two rooms in the house reserved for Mr. Popoff's use when he visits. The factory is on this estate. About two miles further inland is another estate called Zawatnoyer, and the third estate, Otradnoyer, is reached by rail (station on the estate) eight miles from Batoum. Out of 15,950 tea bushes brought by Mr. Popoff from China, Japan, Ceylon, Himalayas, Assam and Java, only some 2,760 are now alive; but there are on the three estates a total of plants, put out to the end of 1896, equal to 17 acres, and in 1897, 24 acres—taken at 2,700 to the acre—there are now in all about the equivalent of 185½ acres planted. After I had thoroughly gone over these three estates I proceeded to Moscow—a day and night by steamer and 52 hours by train—to interview Mr. Popoff. I found the cold *too terrible*, in spite of the fur coat Mr. P was good enough to lend me! My stay in Moscow was protracted longer than would have been the case, as the Dowager Duchess of Sutherland was on a visit to Mr. and Mrs. Popoff, and his time was not always at my disposal. All estate matters, as conducted in Ceylon, were most thoroughly gone into with a view to the introduction of such changes in working as might be suitable here. It was decided that no new clearings should be opened this year, but that the existing area should be worked up to a better state than at present. We were delayed by a gale on our return journey to Batoum. The hillsides are terraced, and the banks of the terraces turfed—from a distance this has a very untidy

a ppearance—the levels of the terraces are dug two feet deep and planted; the flat land is also dug in a similar way and every root and stone removed. There are two large glass houses for germinating seed. At the present moment we are expecting from China *665* maunds of tea seed! which, planted 4" by 4" would, if all germinated, require nurseries to the extent of 81½ acres including drains, &c.!! and there are now *three* million seedlings in nurseries. They tell me they have found pruning a mistake, and before last winter only cut off the *ends* of each branch with scissors: The flush is now coming on, but has been delayed this year by the cold weather; in about a fortnight I hope we shall begin plucking and it will be my duty to give the order for this work to be carried out. My especial duty is the manufacture of tea. There is a good factory—*all* iron, withering loft above with jute hessian tats—it was built by Messrs. "Sirocco" Davidson, who also supplied all the machinery, viz:—12 H.P. steam engine, roller, dry tea sifter and equaliser, ditto cutter and equaliser, oxidiser, down-draft sirocco, packer, machine for compressing pillules and hydraulic press for tablets, and electric machine. Also, Chinese hand sieves, pans, chulas and winnowers. It is lighted by electricity; there is a telephone from the factory to the office and thence to my house.

Each of the estates is worked by a head-gardener with an assistant, the labour being Turks and Grozines—all *men*. The office and financial part is managed by a gentleman with an assistant, the latter being also a dispenser. A weekly meeting of the three gardeners, the book-keeper and myself takes place, when the work being, and to be, carried out is discussed, it being necessary for each of us to visit the three estates weekly. At these meetings we air our opinions and pass them on to M. Popoff, who decides what is to be done. Should the others differ from me on what I consider a vital point I am to write or wire to Mr. P. direct.

The crop will be only some *12,000 lb.* of tea this season, as I have advised husbanding a great part of the estate.

The pillules and tablets made here would be of inestimable value for soldiers' use during warfare as the space and bulk is so much reduced, and I commend this *seriously* to the attention of the military authorities.

I called on the British Consul here, Mr Patrick Stevens (Badminton Club), who was very civil. He showed me samples of Indian *green* teas which he says are largely consumed in the Asiatic provinces. (By the way, I am still in Asia!) On the 1st instant I entered in my diary that I thought it would be long, if ever, before Indian or Ceylon teas (black) ousted Chinas in Russia, for the reason that they do not lend themselves to the customs of the people, as does the China tea; and Mr Stevens used to me almost identically the same words. The Russians like *very* weak tea, *very* hot, and *plenty* of it at a sitting, many times a day. The China article is put into a teapot with only a little boiling water and kept on the top of the Samovar (or urn) where it is continually "drawing." A little only of this is poured into a *tumbler*, which is filled up with boiling water from the samovar, two or more lumps of sugar are added and generally a slice of lemon—it is *rare* to see milk used—the teapot is replenished with a little boiling water on the old leaves continually. This method cannot be carried out with Indian and Ceylon teas as, after the five minutes' "drawing," it begins to cool and it would be difficult to make it in sufficient quantities for their constant use. Indians and Ceylons are nicer with milk than with lemon. The poor classes drink an immense quantity daily, *very* weak, and they could not get milk.

MR. J. C. ROBERTS' NEW TEA BOX.

Mr. Roberts writes:—"It is encouraging at least to hear that merchants, and others amongst the unofficial residents, have accorded my sample some favorable notice and attention. Numerous specimens of compressed wood (made of Ceylon timber with my cement) forwarded to the Colonial Secretary, have attracted no interest in Government circles as I have not received any acknowledgment of them. I really hoped that they would be of public interest, (also possibly the Tea chest going forward shortly) as they are made of common kinds of wood at present practically of no value, and which in fact never can be as plain timber. It means in fact that, if the processes are a practical success, as I think these samples sent forward shew, the Island possesses in its forest reserves an unsuspected value, if encouragement is given to develop it."

COFFEE PLANTING IN BRAZIL.

THE DUMONT ESTATE.

35 MILES OF RAILWAY: THE LARGEST COFFEE PLANTATION IN THE WORLD.

12th April, 1901.

Four and a half years ago the group of Coffee Estates known as the Dumont Company changed hands and the French proprietor sold out to the London Company who paid the enormous sum of *one million eight hundred thousand pounds* for the property. It was the general

OPINION IN BRAZIL

that Dumont sold out for a good price and that it would take the new Company all their time to work the estates to pay, as they were taken over in bad order and during the past four years required a liberal expenditure to keep down the heavy weeds and grasses *(for Brazil grows weeds)* and labour is very expensive. Chiefly Italian and Spanish families engage themselves as "Colonials," working by contract if married and possessing a family. The single men work as daily labourers called in Brazil "Comarádos"; their pay is from 2·50 to 3 milreis, (a mil means one thousand, therefore the milreis would be 1,000 nickel coins.) Paper money is used in Brazil and

EXCHANGE

is always rising and falling; three years ago the milreis were down to 5d. English money and last August went up to a shilling. One of our contractors who planted and cultivated eighty thousand trees was recently paid off and doubled his money by the rise in Exchange. On the other hand the officers of the company, who are paid in gold, stand to lose money in Brazil as the purchasing power in stores of the milreis never changes; and one Officer or Superintendent of a section had his pay raised fifty pounds, yet he had to draw on private money to meet expenses. This was brought to the notice

of the company in England and they refused to increase the salaries of the Administrators or Superintendents. The consequence is they are all very much dissatisfied. The necessaries of life are much

DEARER IN BRAZIL THAN IN CEYLON,

and not of such good quality; beans, rice, and corn are the chief articles of food used by the labour.

It is an old-time custom in Brazil to allow the Italian and Spanish Colonials to grow their own crops of rice, beans, corn, manioc, tobacco, arrowroot, and sweet potatoes between the rows of coffee; the result of this is impoverished soil, short crops of coffee, and a large percentage of dead trees.

However, there is no remedy against this evil; for the European labourers and their wives and children must live; and, in addition to growing food stuffs in the coffee, they keep an immense number of goats, pigs, cows, and horses.

Hard-working families make money and save sufficient to return to Italy and Spain. Others, who fall sick and get into debt, have an exceedingly rough time of it on the coffee estates of Brazil.

ON THE GREAT DUMONT ESTATE

there were about 5,000 (five thousand) people, including women and children; of the above 5,000 perhaps 1,000 men would be obtained as contractors and daily labourers. There are 13,000 (thirteen thousand) acres of coffee under "cultivation," that would be about 13 acres to one man to keep in order and harvest the coffee crop. This

BARBAROUS SYSTEM OF STRIPPING THE TREES

with the crop in all stages of ripeness, wasting the green coffee, because scarcity of labour prohibits more than one round of picking, is the ruin of Brazil; and much of the crop is trodden into the ground by men and horses. Another "eyesore" in Brazil is the old crop hanging on when the new crop sets its blossoms.

The trees suffer fearfully from overbearing. The crop ripens in April, May, June and July. The gathering is hardly begun and the estates must be cleared of grass and weeds. The weeds are ploughed into the ground with a considerable quantity of coffee dropping off the trees with every shower of rain.

Thousands of pounds worth of coffee are lost every year in Brazil through estates not being ready to secure their coffee crops before the heavy rains set in. The planting of food crops throws everything into arrears and the fields must be cleaned up before the stripping commences; no wonder the prices of Brazilian Coffee are always so low in the London market when the green coffee is mixed with the matured.

THE PRUNING, TOO, IS BARBAROUS,

five or six trees in a hole, some of them ruthlessly chopped down with an Axe, trusting to the judgment of an Italian farm labourer as to which should be taken and the others left. I have seen fine trees killed and four or five long fishing rods left for next year's crop. One of the most ghastly sights to be seen is a "*pruned*" field of coffee in Brazil.

There is little or no chance of any improvement being made in the "*cultivation*" of coffee in Brazil for practical experience is at a considerable discount. "*Nigger driving*" from daylight till dark, the old slave-bells only ringing for meals in the field, and work from sunrise to sun-set and such a long trudge back to the Colonial barracks. *Slavery is supposed to be abolished!* But in Brazil there are *white slaves.* I have known them work 18 hours out of 24 and in some cases hoe the coffee by moonlight to keep clear of debt and get out of Brazil and return to Italy. And what is it all for? To enrich a few individuals, non-resident.

BRAZIL WILL ALWAYS BE A HARD COUNTRY TO LIVE IN.

There is no enjoyment of life there for an Englishman and only men who have led a hard life could endure life in Brazil.

The Dumont Company has not got a practical coffee planter in their employ; some of them had never seen a coffee bush until they went to Dumont.

A slight knowledge of Portuguese seemed all that was necessary to drive and get as much work out of the Italians as possible (the Italian Estate labourers speak and understand Portuguese.) Most Fazendas (estates) keep an "Amazame" or general store and supply rum—pork—rice—flour cloth and ready-made clothing. New arrivals generally get into debt the first year in Brazil.

The Dumont Company get their goods from the Army and Navy co-operative stores and their "Amazame" does a good business with the employees. Another great advantage on Dumont is the

THIRTY-FIVE MILES OF RAILWAY

promptly despatching stores to the different sections of the estate and to the Colonials.

The making of the railway has much improved the value of the property since it was purchased from Dumont. Accidents have occurred through the sparks from the engines falling on rubbish-heaps and coffee has been burnt as well as buildings. A great fire took place shortly after the completion of the new factory. All the newly-put-up machinery for pulping and curing coffee, with a considerable quantity of coffee undergoing the process of curing, was burnt with the buildings in one night—a very bad thing for the shareholders of the company in the second or third year from the starting of the company. The coffee crops have steadily increased during the past three years. Thirty-two thousand cwt from 13,000 acres only works out *3 cwt per acre*—a mere maiden crop in the palmy days of coffee-planting in Ceylon. The twenty or thirty per cent of vacancies were supplied, and now the young trees, three and four years old, are cropping heavily, particularly on "Aqua Vermilia" (red water) and "Moreira" the section on which the writer was employed.

If the weather and other circumstances are favourable

THE CROP THIS YEAR

will be a very large one, but the young trees, unless relieved of their heavy crop of berries, will die out or take a rest from bearing for two or three years. Prices are likely to go down, owing the Brazilian crop expected being unusually large this year, fifteen thousand hundredweights being spoken of as under the estimate. Labour will be very short indeed, through the rise in the value of the milreis. The Italians drew their money (Brazilian) and turned it into gold and, as they are obliged to give notice to leave the estates before being paid off, many will remain in Italy. The Government of Brazil had lately discontinued giving passages to intending immigrants; consequently the Dumont Company were obliged to send an officer from Dumont to recruit Italian labour.

There are

TWENTY THOUSAND ACRES OF FOREST LAND AVAILABLE FOR COFFEE

planting belonging to the Dumont company, but the *five millions* of coffee trees now under "cultivation" will take them all their time to manage with labour daily getting scarcer and dearer There are some "*smart*" Directors in the company, particularly the one who visited Brazil and reports occasionally on Dumont. He ought to go there again and try and give the anxious shareholders a dividend; they have waited very patiently for the past five years and ought to get a fat one this year. I should take a small gang of practical coffee planters from Ceylon with good digestions and not afraid of ghiggars, ticks and Berne flies—to say nothing af the dear little mosquito (the writer had extracted during four years in Brazil *no less than 200* ghiggars from underneath every toe-nail of both feet.) The Portuguese. Brazilians, Italians and Spaniards called it a recreation on Sunday to dig them out of each other's feet. Of all the vile insects on earth, the Berne-fly is the worst. She

LAYS HER EGGS INSIDE YOUR FLESH

and hatches three very ugly insects an inch long with three rings of bristles round the body and sharp nippers. They take about six weeks to develop under your skin, then commence to turn somersaults just when you want to go to sleep after a hard day's work in the sun.

The natives of Brazil adopt a novel way of extracting the brute when full grown; they tie on a piece of raw pork and the Berne comes out of your skin and takes a header into the piece of pig skin.

Eighteen took up their lodgings in the plumpest parts and it was very interesting to stick a little nicotine from an old pipe into their nest, then out they would jump; but some were so fat they had to be screwed out and great was the relief.

Ticks were very plentiful in the grazing grounds and we often got covered with them when out at night, fighting with the bush fires on our boundaries and trying to save our fences and gates from destruction.

I had a

VARIED EXPERIENCE WITH SPECIMENS OF BRAZILIAN ENTOMOLOGY

and I have brought back as a trophy the nine rattles of a large rattlesnake I killed in my coffee. His chum came to look for him next day and was duly killed—snakes are very numerous and the ones most frequently found in the coffee were the rattlesnake and the black and red-coral snake.

"There are snakes in the grass" in human form of every nationality and an Englishman little knows what is in store of him in that nigger country. The more polite the people are, the greater the injury they are likely to inflict. There is much to write about Brazil after four years in the coffee districts of Sao Paulo. My first Estate was called "Vista Alegre" (cheerful view.) Mr W the proprietor took me round to see some of the large Coffee Fazendas. This district between San Carlos de Pinhal and Colonia was much cooler than the district of Reberu en Prato (Black River) where the Dumont Estate is located.

After this I will send you a few more notes on Brazilian life and customs and tell your readers something about the cities and the Government Railways.—Yours faithfully, HENRY COTTAM.

THE PROPOSED NYASSALAND RAILWAY.

(*From a correspondent.*)

A petition has been recently presented to His Majesty's Consul-General by residents and Civil Servants at Blantyre for transmission to the Home Government, asking for a guarantee for the proposed railway between Chiromo and Blantyre. It appears that the present system of land transport by porterage of natives has become inadequate to the needs of the country, and is tending to the rapid depletion of the labour market —an evil which, apart from its injurious effects on coffee-growing, the staple industry of the country, has so seriously impaired the import trade that at times many thousand loads may be seen lying for months on the wharves between Katungas and Chinde blocked *in transitu* through lack of labour.

To the more far-sighted traders these delays present a graver aspect than that of individual loss or inconvenience, for they leave the little Protectorate exposed as a trade route to the rivalry of Portuguese and German enterprise. On the borderland the Portuguese administration is in full activity, and the natives from the Protectorate are crossing over, despite the hut tax, to support in alien territory those industries which are the mainstay of the Protectorate. The stream of labour is thus diverted, and the production of coffee, tea, tobacco, and fibre in British Central Africa is threatened with extinction.

It is calculated that the construction of the railway would place at the disposal of this industrial community more than 40,000 labourers annually, and would set the planting industries on an assured economic basis.

The estimated cost of the proposed line which is to connect the Upper and Lower Shirwa—thus opening a thoroughfare for 1,200 miles into the heart of the Lake districts—is £300,000, and the petitioners seek a guarantee from the British Government of 2½ per cent on this amount.

Founding their calculations on the imports and exports for 1899-1900, they count upon a return of 7 per cent. on the capital invested, and maintain that, unless exceptionally bad seasons are met with, no call is likely to be made upon their guarantors.

The civil servants in the Protectorate have left nothing undone to make straight the way for the construction of the line. To prevent the transport and industrial systems of the Protectorate from being disorganised by the removal of a large quantity of labour from the already insufficient market, the Chief Judicial Officer has made a provisional contract with the Companhia da Zambesia which will provide from outside the Protectorate a supply of labour at a moderate price for building the railway, and negotiations have been entered into for the purchase of the material of the old Beira Railway.

The project possesses no inconsiderable political importance, as it would, if successfully carried out, effectively secure the British hold upon the Lake country of Africa.—London *Times*, Feb. 28.

CITRUS TREES.

We like to gather the experiences of fruit-growers of other lands, especially those that are now competitors with us. A successful orange-grower in Florida writes of his experience there as follows:— "In planting a tree I would cut the taproot off,

and three or four others will come out in its stead. The grape-fruit is a raining tree. It draws water from the ground by means of its dense foliage, and exhales it into the air; the rough lemon is the same. Both will often cause rain to fall from their leaves on a dry day. The rough (Florida) lemon has the largest plexus of feeder roots of any of the citrus family, and will thrive on poorer soil. The sour orange, the healthiest of the family, hardly grows fast enough for the grape-fruit but if you will often split the bark from the bud to the ground, you will hasten its growth in size and strength. In a plot of ground 210 feet square I would plant 81 grape-fruit trees about twenty-three and half feet apart, leaving a strip ten feet wide between them and the fence, and in square between four grape-fruit trees I would plant six by four tangarines and king oranges, making 145 trees to the acre." Our own experience points to the Seville sweet orange stock as being even healthier than the Seville orange, but as being a slower grower. The rough lemon stock makes a marvellously quick-growing growth but doubts are thrown upon it here as to whether it lasts long.

Another writer says:—The Dancy tangarine does best on rough lemon, grows faster, yields more fruit larger fruit and it matures earlier. Grape-fruit does well on lemon or on sweet stocks; on rough lemon you get large fruit on sweet or sour stocks, medium. He has planted from October to January, and even in June; but the best time is from November 20th to January 1st, according to his experience. Cut off half the top before planting or defoliate it; defoliate it entirely is still better. It takes nerve to do this, but it is true wisdom. You hate to spoil the pretty top, cutting it all to pieces, but you get some with all their tops left on and some without, and in a year or two you will surely wish you had cut them. See that no nut-grass roots are in the tree roots before you plant; it is a great nuisance. Plant about twenty by twenty-two feet. You may plant 125 trees on one acre, and 75 on another, and for the first ten years you will gather more fruit from the 125 trees; but how about your son and your grandson? One orange tree is for a century, and one should not plant for his selfish gain alone, to the robbery of after generations. You can, for a few years, plant four or five rows of pineapples between the orange rows and do them no harm; but beware of letting them stay too long. Examine the trees carefully as to when they are ready to occupy the middles themselves. Apply two or three pounds of good fertilizing at planting.—*Journal of the Jamaica Agricultural Society* for February

AERATION IN TEA.

Aeration is a word writ large in every planter's note-book being an operation employed in almost every process connected with tea cultivation and manufacture. The object of hoeing is to open up and expose the soil to the free action of the air, aeration of the soil being essential to the growth of the plant. In pruning also the bushes are thinned out to allow full play of air. In plucking, however, instead of allowing the air free access to the leaf nipped off the bushes, it is jammed tight into baskets, the result being that, owing to the absence of aeration, at certain seasons of the year heat is engendered, fermentation is set up, and the leaf turns red and emits an offensive odour. The fermenation is solely due to heat produced by the want of aeration. Needless to say that such leaf can never possibly make good tea. This matter deserves every attention, and if only teas of good quality are to be manufactured this season it behoves planters to make some arrangement whereby aeration shall be insured. One leaf gets heated in the baskets it is deteriorated and no after manipulation will ever recover it. Withering or wilting is aeration pure and simple, the air circulated over and through the leaf being cool or warm according to the season. The next process, in which aeration should always have place, although it does not do so, is rolling. Rolling always generates heat, and the latest machines are so constructed as to admit of as much air as possible getting to the leaf, so as to counteract the heat set up and caused by the friction of the leaves one against the other in the process of rolling. The leaf should in no way become discoloured in rolling, it should be discharged from the machine a healthy green colour. Rolling and oxidation are two distinct processes, and must on no account be united into one operation. In former days some planters used to roll out their colour, but no one dreams of doing such a thing now. Oxidation or colouring is nothing more or less than aeration, cool damp or moist air being played over and through the rolled leaf. For oxidation, pure and simple, heat is not required; if anything it is inimical rather than favourable to the process,—it should in fact be wholly eliminated. Finally, aeration is everything in the firing of the green leaf, and in the final firing of the dried and sifted tea. Here, however, heated air is the substance employed, being driven over and through the leaf or dried tea in the driers. Air then, either cool, warm or hot, dry or moist, plays an important part in every operation or process connected with the cultivation or manufacture of tea, save the very last stage, when the finally fired tea is packed in a lead casing which is soldered down to exclude the air. Aeration is thus a subject which requires close study, and more attention than has hitherto been paid to it, if good quality tea in the future is to be the rule rather than the exception. —*Indian Planters' Gazette*, Mar. 30.

FAILURE OF COFFEE IN BURMA.

We (the Rangoon *Gazette*) hear that Mr. de Souza's coffee plantation at Thandaung has completely failed this season, all the trees having been attacked by blight. Our crop in the Toungoo district have also been seriously affected, but none to the extent of Mr de Souza's. Mr de Souza's former plantation is to be leased for building purposes by the Government.—*Times of Burma*, April 10th.

PLANTING IN MEXICO.—We omitted yesterday to draw attention to the interesting letter respecting "rubber" sent us by Mr. E. O. Darley, formerly a well-known Knuckles Planter. Mr. Darley should tell us a little more about his everyday planting life and the crops he is gathering in.

TEAK PRESERVATION IN SIAM.—Teak merchants in Siam are manifesting considerable interest in the new precautions for forest preservation, which are being taken by the Siamese Government with the advice and assistance of Forest Officers from Burma. The Government is now bringing the teak forests of Siam under systematic control. It proposes in effect to considerably limit the area of forests now being worked, and to charge rentals in addition to the present royalties. It now issues the forest leases itself instead of allowing the local "Chaos" or chiefs to grant them as formerly. It is increasing, too, the limit of girth of trees which may be felled, so as to bring the practice more in line with that obtaining in Burma. The effect of all these measures will, no doubt, be to somewhat limit the teak output while preserving the lives of the forests. No diminution from this cause is likely to be felt for some years yet, however.—*Pioneer*, April 13.

THE SO-CALLED "LOST ART" IN TEA MANUFACTURE.

I.

Ere proceeding to deal with the chief theme of this paper, we must premise that the enormous accumulations of low grade tea in importers' and traders' hands at home will need a very large proportion of Pekoes to salt them for consumers' use, so that the argument for instance on fine plucking may be considered closed, and we do not see any necesssity for departing from the usual method of manufacture, in so far as the three or four leaves and bud are concerned, as such leaf will be needed for the necessary blending, but as in the usual course of plucking a good quantity of larger leaf is unavoidably brought in, and autumn requirements denoting depletion of home stocks may demand more being taken off the bushes, the planter has to decide whether he will still treat this leaf in the fashion hitherto in vogue or, by departing somewhat from that, fit it for accommodation to the pronounced taste of the working classes in Europe and that which the American and Colonial consumer looks for. What we have to say upon the subject, it must be understood, is not written to provoke controversy, but to put before the manufacturer a summary of the methods pursued both in the plains and hills that resulted in furnishing the consumer, who had been used to the slightly sweetish teas of China Congous, an imitation that was approved of, leaving our readers to flout or adopt the suggestions according to their own inclinations or prejudices. On most, if not all, factories, everyone employs the common cane or wire sieve to separate as much as possible the coarse leaf from the fine after the first roll; the more effectually this is done the less manipulation is required subsequently. Now we leave the finer teas alone for the present and recommend that the coarse leaf be placed in the roller, going slow as possible, in order to retain the juice in the same way as in the old hand-rolling days, 1869-72, when the leaf was passed from hand to hand along the line of men, the balls being broken up and disintegrated by each, with the result that, on reaching the end of the line, the leaf had acquired that light mahogany colour and sticky consistency indicating oxidisation has sufficiently been attained for firing. In very wet weather the desired condition will not be reached as quickly as when the reverse obtains, in which case resort must be had to forcing under blankets as is now done in some factories, and here again constant testing of the mass to detect fermentation will be necessary; the leaf must be turned over and over and the hand thrust in: a bath thermometer will prove of service in denoting any tendency to heating. Then if spread thinly out on mats, chelnies, or tables, provided a temperature of at least under 50° can be secured, an evaporation of tannin takes place and at this stage the greatest care is necessary, for, if actual fermentation is allowed to set in, it is almost needless to say sourness results; if the leaf is constantly examined by being held against the light, diminutive hairs show upon it, and as soon as these appear the leaf must go to the sirocco at once, but thinly spread in the trays to be *set*, in the first instance; if the heat in the machine can be properly controlled, five minutes will be quite enough for the contents of a dozen bottom trays to be collected together and transferred to the upper ones, but overpacking (as we showed on the 31st March last year) must be avoided; the main object to be kept in view is to avoid haste and dumping too much damp leaf together; for however careful the battyer may be, dumping and too rapid firing dries the exposed layers, only half drying the centre, destroying all chance of uniform roasting and, despite the most thorough bulking, an ununiform tea results. We do not pretend to a knowledge of what chemical action is set up in oxidising by exposure at low temperature to evolve the saccharine principle that distinguishes tea so treated; that it acquires such is undoubted, as anyone can satisfy himself of by tasting samples of genuine China or Japan Congous; and it was by treating leaf in the manner roughly sketched out that the teas made in the Nilgiris in 1871 acquired their well-deserved popularity, but that the method was not unknown in Sylhet can be proved, if papers are extant so far back as 1861, when samples sent home through Messrs. Grindlay and Co., on account of the Sylhet Tea Company, received high encomiums from Messrs. W J and H Thompson, as also from a well-known tea dealers' firm of that day, Antrobus and Co. With the inadequate space and *kutcha* buildings then available, coupled with want of appliances to cool down the leaf in those days it was found quite impossible in the plains to carry out this forcing later than the middle of March, so the method gradually fell into disuse and was forgotten, being replaced by the present hurried system by which, as has been repeatedly pointed out, undue evaporation is stimulated from the outset; the rolling machines squeezing out the constituents by turning the leaf into a sodden stodge. Panning slightly rolled leaf does away with the tedious process of slow rolling out the colour to a great extent, and if care is taken in regulating the heat the grayish tinge will be developed, while, if all leaf is put through the process indicated, the slower the rolling, the more gradual the firing, coupled with close attention to the appearance of the hairy fluff, the finer will be the tips, the more delicate the flavour, and more pronounced the sweetish taste the bulk of consumers demand.—*Indian Planters' Gazette*, March 30.

II.

It would be impossible to lay down one general rule for all factories, as sites, temperature, and requisite accommodation differ so widely, but we have endeavoured to give an outline of the conditions leaf should assume at the several stages of manufacture. Actual green tea such as is imported from China can be approached, in so far as flavour goes, by elaborating the tedious panning and exposure, very slow firing, and the admixture of small quantities of powdered gypsum, as also the sprinkling of the leaf, in the final panning, with the same preparation—weak tincture of copper—that is sometimes used in giving the brilliancy to pickles; but the use of either of these minerals is to be discouraged, and in fact, if Mr Mansell's contemplated Bill passes the House of Commons, would render teas so doctored liable to confiscation at the Home, as they are now at the American Custom houses. Less objectionable colouring matter could be obtained from the solution of the plant used by Manipuris in dying their *keishes*, but it would need to be administered when the leaf was almost finished. We, however, may leave the

facing of tea alone, as one or two of the ingredients, used by such Chinese farmers as combine tea and sericulture cannot be more particularly alluded to for fear of creating a prejudice against all and any green teas our planters may send forward. No pans were used at any stage in the manufacture of the Belmont teas or other estates in the Nilgiris on which the same system of manufacture, introduced in 1871, was adopted; nor were any fabulous prices realised; the London auction figure was 2s. 9d., the retail price at Ooty and Madras Rs 1-8 per pound. The use of bags was taken up under a misconception, the leaf being placed in these and rolled, in an old-fashioned mangle, to wither, after the invention of Mr James Nelson on the Labac garden in Cachar in the same year; the fallacy of the operation as to mechanical rolling soon became apparent, and it was at once abandoned by the owner of Tudor Hall, who alone tried it. No secret was ever made as to the method of manufacture pursued; but as curious visitors intruded at unseasonable hours, requesting rather liberal samples, a notice had to be placed on the gateway that the premises were private and not public.

The experiments carried out by Mr McGuire in Ceylon tend to show that with suitable buildings the temperature needed to secure that necessary for developing the syrupy flavour can be had in hill and plain alike, irrespective of climatic influences. Should this be correct, all difficulties of fitting our teas to suit any taste may be considered at an end; and although the spreading out or keeping leaf in a state of suspended animation, as it were, may involve the erection of a cooling house, such need not be more expensive than the sheet-iron rooms on board our large fruit and meat carrying vessels; while in Assam and Bengal, at any rate, we have no dearth of a non-heat-conducting material in the common sola of the paddy fields; refrigerating appliances also are becoming cheaper and more simple in construction almost daily. Adverting to the "steamers," of Messrs Dean and Rae, that Messrs P R Buchanan and Co. suggest should be sent up to some gardens for green tea manufacture, from all we can learn these are a revival or adaptation of the jacketed steam pans invented by Mr. Thomas Barry of the firm of Barry Smith in 1861-62. Though only used for panning half-rolled tea, and consequently abandoned when all panning was discontinued, they would have been useful in withering; but, as Mr Davidson with his above-mentioned cool wither has anticipated them, unless they will serve some other purpose, no further allusion need be accorded them. We are not in a position to say whether the process of manufacture now pursued at Belmont is the same as introduced in 1871, but a glance at the Directory shows that, besides Messrs MacDowell of Madras, there are seventeen residents round about Ooty and Coonoor who can vouch for the superiority in flavour and suitability of taste those teas were distinguished for at the time we refer to. We do not see that any difficulties present themselves in making tea in the manner suggested. Slow rolling, constant separation of the leaf, retention of the juice, with ordinary care in carrying colouring to the verge of, but not up to, actual fermentation, are not much to demand from the manufacturer; and, if meteorological vagaries can be rendered of no account, night working would be unnecessary. The present machinery is all that is required, while, if pans should be deemed necessary, those of suitable size are procurable in almost any bazaar throughout the country. In conclusion, we may mention that the late Dr. Barry contended, and his opinion was confirmed by other chemists, that flavour in tea was better attained by direct heat from charcoal than by any hot air or other means of curing. Unfortunately the wholesale destruction of wood that has gone on in the tea districts renders a universal return to charcoal out of the question; and we ourselves do not think the above contention can be sustained, as the slump in tea has arisen from over-production and throwing coarse mediums on the market; while we believe the American, Colonial, and home demand for sweetish Congous can be as well met by sirocco dried tea as by the old methods or modifications thereof. It would be advisable, however, that this matter should be set at rest; and we invite one or two of our readers to prepare samples in the above described manner for submission to the London trade; for, high as the price of charcoal has risen, some means of cheapening it or substituting an inodorous fuel in its place may be devised. However, this is a matter for subsequent consideration.—*Ibid*, April 6.

PLANTING NOTES.

CARDAMOMS.—In the Ash of Cardamom Messrs Cowley and Catford have discovered cobalt, nickel, manganese, and iron, and they attribute the black ash to the formation of phosphite.—*Chemist and Druggist*, March 23.

COMPETITION IN QUININE PILLS.—The *Sourabaya Courant* states that the united German quinine-factories propose shortly to commence the sale of quinine pills in all the principal towns in Java, at prices based upon those paid for Bandong quinine at the Batavia auctions. This would doubtless result in a loss to the German works; but it is thought that it will have the effect of forcing the Bandong factory to discontinue the manufacture and sale of quinine pills, from which they derive a considerable income. The Java paper mentions this as a danger threatening not only the Bandong factory but also indirectly the cinchona-planters, and it exhorts the latter to persevere in the co-operation which has led to the present favourable state of the local quinine industry.—*Chemist and Druggist*, March 30.

JAVA GOVERNMENT CINCHONA.—The report on the Government cinchona plantations in Java for the quarter ending December 31, 1900, states that the young plants are in excellent condition, and are developing strongly. This is due not only to the favourable weather during the period under review, but also to the fact that only healthy and large plants have been used for planting out. The plantations are free from disease and insect-pests, with the exception of those in the western part of Tirtasari, which are somewhat seriously affected. Contrary to recent experience, there has been a great lack of labourers, a fact which is also felt in private tea and cinchona plantations. By the end of December practically the whole output had been shipped, partly to Tandjong Priok (for export and partly to Bandong quinine factory. The whole yield of bark in 1900 came to about 560 tons; of this quantity 378 tons were exported to Holland, and 182 tons worked up at Bandong. At the auction of cinchona-seed some specimens fetched as much as 46*l.* per packet of 25 grammes: shoots for grafting were sold at 16*s.* 8*d.* each.—*Chemist and Druggist*, March 30.

TO ALL PARTS OF ASIA, AFRICA, AMERICA AND OCEANIA.

Seeds & Plants of Commercial Products.

Hevea Brasiliensis.—Orders being booked for the coming crop, August-September delivery, 1901 ; booking necessary before the end of April ; quantities of 100,000 and over at special low rates. Plants available all the year round. 100,000 and over at special low rates. A leading Rubber planter in Sumatra, who purchased 50,000 seeds in 1899, and 100,000 in 1900, writes us, under date 15th November, 1900:—"I received your letter of 20th October, from which I learn that you added another case of 5,000 seeds to replace the loss, &c. I am satisfied hereby, and even after this adding I am satisfied by the whole delivery of this year."

Castilloa Elastica.—True superior variety cultivated in Mexico, seeds from specially reserved old untapped trees. Orders booked for August-September delivery, 1901, booking necessary before the end of March ; large quantities on special terms ; Plants in Wardian cases.

Manihot Glaziovii.—Seeds and Plants available all the year round, 100,000 and over at special low rates. A Mexican planter, in sending an order for this seed, wrote on the 22nd August, 1900:—"If they arrive fresh and germinate easily I may send you larger orders, as they are for high ground where the Castilloa does not thrive."

Kickxia Elastica.—(*Funtumia Elastica*).—Seeds and Plants, orders booked. (Lagos rubber.)

Ficus Elastica.—Seeds available in May-June ; booking necessary before the end of March ; also plants.

Urceola Esculenta and **U. Elastica.**—Same as above. (Burma rubber.)

Parameria Glandulifera.—Orders booked for seeds for January-February delivery ; also plants; immediate booking necessary. (A good rubber creeper of Malacca.)

Landolphia Kirkii.—Seeds in July-August, early booking necessary. Plants can be supplied all the year round. (A highly-recommended species.)

Chonemorpha Macrophylla.—Seeds and Plants ; orders booked. (A very valuable rubber-yielding creeper.)

Memusops Globosa and **Payena Leerii.**—Seeds and plants in July-August, booking necessary before April.

Achras Sapota, Willughbeia Firma, W. Edulis and other **Rubber and Gutta Percha** yielding Trees and Creepers; Seeds and Plants.

Cinnamomum Zeylanicum (Cinnamon superior variety). New crop of seed in April to June, booking necessary before the end of February ; also plants.

Coffea Arabica, Liberian Hybrid and **Maragogipe Hybrid.**—New crop March-April ; immediate booking necessary.

Cinchona Ledgeriana.—Seeds now ready, also other varieties.

Seeds and Plants of Nutmeg, Clove, Sandalwood (white and red), Pepper, Cardamom, Vanilla, Cacao, Tea, Coca, Fibre, Medicinal and Fruit Trees, Shade and Timber Trees, Eucalyptus various varieties, also Palms, Bulbs, Orchids, &c.

Our enlarged Descriptive Price List of Tropical Seeds and Plants of Commercial Products of Foreign countries for 1901-1902, now being prepared, and will be ready in a few months.

"SOUTH AFRICA."—The great authority on South African affairs of 25th March, 1899, says:—"An interesting Catalogue reaches us from the East. It is issued by WILLIAM BROTHERS, Tropical Seed Merchants, of Henaratgoda, Ceylon, and schedules all the useful and beautiful plants which will thrive in tropical and semi-tropical regions. We fancy Messrs. Williams should do good business, for now that the great Powers have grabbed all the waste places of the earth, they must turn to and prove that they were worth the grabbling. We recommend the great Powers and Concessionaries under them to go to William Brothers."

Price List of Seeds and Plants for CEYLON use, post free, on application.

Our new Descriptive Price Lists of Seeds of Shade Trees for Coffee, Cacao, Tea, Cardamoms &c., Timber Trees, Trees for Avenues, Hedges, Wind and Shelter Belts, Ornamental Trees, Shrubs and Climbing Plants ; and Seeds and Plants of Palms, Calamus, Pandanus, Cycads, Tree and other Ferns, Crotons, Orchids, Bulbs, Dracænas, now being prepared, and will be ready shortly.

Special Arrangements made with foreign Governments, Botanical and Agricultural Departments, Planters and others for supplying seeds and plants of Commercial Products in large quantities.

Agents in London:—MESSRS. P. W. WOOLLEY & Co., 90, Lower Thames Street.

Agent in Colombo, Ceylon:—E. B. CREASY, Esq.

Telegraphic Address: WILLIAM, VEYANGODA, CEYLON.

Lieber's, A.I. and A.B.C. Codes used,

J. P. WILLIAM & BROTHERS,
Tropical Seed Merchants,
HENARATGODA, CEYLON.

Correspondence.

To the Editor.

COFFEE IN B. C. AFRICA.

I.

DEAR SIR,—The cause of diseased beans is in my opinion not far to seek and may be attributed to three particular enemies of the coffee tree viz.—Drought, Borer and Grub.

DROUGHT.

The first of these three is very much to be dreaded at low elevations from 1,500 to 2,700 feet altitude; above the latter elevation coffee does not suffer *visibly* so much, but it does in the course of years become very visible indeed, and experience has shown careful observers that the trees become so damaged by the scorchings of a few dry seasons, drying up the very life sap of the trees and murdering the whole of the bark, pith, and even the wood of the coffee bushes, leaving alone the (*lungs leaves*) brittle dry, cankered and almost sapless —which is quite unnatural to a healthy coffee bush in its proper element. When the coffee tree gets into the condition alluded to above, there is no cure for the resulting light chipped, and black beans, caused I think by the weakened state of the tree, but to cut it down, and let a sucker grow up from the bottom. By selecting the healthy sucker, which is usually the biggest and strongest, a sound crop is secured again after 18 months or so. Now to prove that the scorching has a lot to do with damaged beans, I am quite sure no one will deny the fact that young coffee that has not been scorched always gives a sound crop, but the older the estate is, the more damaged the coffee becomes if the seasons have been exceptionally dry till almost worthless, unless cut down as I have stated above.

Cutting down does not always prove a remedy for light and damaged beans, especially at the lower elevation, for I have observed in a very dry year that the trees have been burnt right into the ground in fine or very light friable soil that has undergone much tillage so that cankered, sickly suckers came up, and the only cure for this condition of the tree is pull it out, and replant; and as this usually happens in the richest of soils composed almost entirely of vegetable humus—the plants take root and grow as vigorously as in virgin land.

At this lower level, about 2,000 feet, in dry seasons, our coffee suffers much more than it does at and around Blantyre, where the elevation of most of the estates runs from 3,000 feet upwards; not only does the sap get drained out of the bushes by excessive heat but they lose their leaves and the wood dies back. In such a year as 1897, coffee 1 year old was so damaged that it had to be cut down as it was nearly all black-hearted and cankered, and the trees that were left (supposed to be healthy) were so much damaged that the maiden crop on those trees had any amount of diseased leaves so that it would have been better to have cut all down. This is my own experience, and I am quite convinced that no amount of moisture put into the soil by means of irrigation would save our coffee in such a year. What is wanted is moisture in the air, which this country, being so far from the sea, is singularly void of during October and November, even in favourable years.

To prove this fact I only need to mention that a number of coffee trees under my bath-room where the soil was daily moistured, and by the sides of streams in damp and satuated soils, lost their crops, (when blossoming to the tune of 10 cwts per acre) and wood also. Whereas coffee under a canopy of shade held its crop without losing leaves or wood, and further the coffee under proper shade has never in my experience produced black or spotted beans; this I am prepared to prove any day, that is provided the coffee has always been healthy and grown under proper shade, and not damaged before putting it under shade. What I mean is, healthy plants, *not black-hearted*, planted under a canopy of shade, lofty, does not produce diseased beans in B. C. A.—Unfortunately however the older our coffee grows (when it ought to be in its very prime, yielding fine crops) it gets so rotten that it is hardly worth cultivating in some localities; this fact we need no longer deny.

Low topping in green wood just before the dry months, usually resorted to to force blossom, is a dangerous proceeding in B. C. A. It causes much canker on the upper part of the coffee bushes, and forces out too much flowers, more than a 3-year-old tree can stand, resulting in much injury to the whole bush, impairing its health and vigor for the rest of its existence I may say; whereas if left to nature, say, till a height of 8 feet or more is attained before topping, the tree would not be taxed with over-blossoming and over-bearing before it is able to stand it. Further the bushes are not so easily scorched by the sun and hot winds when well grown high off the ground, and any canker or damage done to the top of the tree, when young, is likely to grow out of it or be topped off when the tree is ultimately topped in matured wood; at whatever height wind and fertility of soil direct. I don't think in any part that I am acquainted with in B. C. A., that coffee should be topped low on account of wind, but I have seen estates where the soil would not support a big tree, in fact coffee should not have been planted at all.

I am not so sanguine now as I was some years ago that coffee is the permanent and remunerative investment that it should be in B. C. A.: doubtless good crops of 6 to 8 cwt. per acre have been secured by some lucky individual planters, mostly maiden crops; and until shade be universally adopted in this country, I am sure those good crops will be the exception instead of the rule.

As for my own part I regret ever having cleared the land to plant an acre of coffee here, and would not do so again after the experience I now possess for I am convinced that

SHADE IS ABSOLUTELY NECESSARY

for the successful cultivation of our staple product, coffee, which let us hope in spite of black beans will always remain king.

If good land could be get at an elevation of from 3,500 to 4,500 ft. coffee would not get scorched, and it would not suffer from borer and grub to the same extent as it does below that elevation, and although we are some 16 degrees south of the line frost need not, I think, be feared unless the situation be such as to prevent a current of air passing over the coffee during the months of June and July (such as in a very low sheltered hollow), by the way, our windy months in B. C. A.

When a coffee tree is weakened by over-bearing, leaf-disease, borer, or grub attacking the skin or roots, or any other cause, the yield will consist of a greater or less amount of defective beans, as a natural consequence, which the application of manure helps to remedy, but no amount of manuring or careful husbandry will prevent the alarming amount of defective beans found in our coffee. This is proved by coffee trees growing amongst manure at my cattle-shed door, which were severely scorched and yield a heavy crop of worthless coffee.

Nothing but lofty well-regulated and thin shade will ever, in my humble opinion, mitigate or remedy the above defects. It is no use advocating the Loquat, Pride of India, or other bushy small trees, as I have seen some writers stupidly doing. One has only got to stand under a Loquat and afterwards under a large-spreading lofty tree on a hot day in November to see the absurdity of some people's ideas of shade, for a shade-loving shrub like coffee, which is a surface-feeder if its roots can only but exist on the surface, which unfortunately they cannot do during the dry months in exposed land

The fine feeding white rootlets' vitality is I am certain destroyed ; in fact, strange to say, very few feeding roots are to be found near the surface on our fields of coffee on this account, but with shade or in a wet climate a singular network of coffee fibrous feeding roots is to be found on or near the surface.

The great heat caused by the sun shining on bare land increased with hot winds during our hot and almost rainless September, October, and November, months does a great amount of damage to our soil, as well as coffee, by exhausting the fertilizing ingredients, which would or should go to benefit the growing crops on the land. This fact is well borne out by the difficulty we have in getting supplies to grow the second or third year; also in this simple fact, viz—when a native hoes a garden in September for a crop of cereals, he does not burn it off till just before he sees the rain is coming, but on the other hand should a bush fire by accident run into his garden, he assuredly abandons that garden and hoes another, for he well knows the nitrogen soon vanishes from exposure to one or two months' sunshine before the rains with which only he is able to plant. Very friable soils retain the heat of a day's sunshine all night and in fact is seldom cool in October and November and no Analysing Chemist is required to prove the damage done, under such conditions, to our best soils through exposure.

It can be easily seen how rich our soils are in fertilising ingredients from the flora they support and the rich harvests of Indian corn and millet they produce, crops which a poor soil will not even grow ; but those almost inexhaustible soils, (which nature never intended to be exposed to the full force of our tropical sun) in the course of a few years must be allowed to run to bush and be covered, to once more renew its fertility—not lost so much by the feeding of a few crops of cereals as by exposure and wash which does not happen from covered land.

It may be said that a good field of coffee covers the land, and it should do so ; but unfortunately coffee, as far as I have seen, never covers the soil in this country.

It needs no scientist to tell us that the soils on our coffee estates are wanting in nitrogen and other organic ingredients after some years' exposure; on the other hand we also need no scientist to show or prove to us that most of our soils are the very richest to be found in Africa or elsewhere. But what we do want to know is, how we can best take care of our rich soils, preserve their fertilizing properties, and renew them for the benefit of the growing product on the land and of man.

It need hardly be doubted that shade trees do all this for us to a great extent.—Then why bare our lands entirely for coffee cultivation ? H. B.

II.

BORER AND GRUB.

Dear Sir,—Borer is one of the worst enemies of our coffee and it escaped my observation till 1893 ; and well do I remember the first beetles I saw and seized on a Momba, bark cloth tree, in the month of November of that year. This longicorn or stag beetle was no stranger to me in Ceylon, although the specimen in that island is darker in colour, glossy, and altogether a handsomer insect than ours is here. The damage done in Ceylon was only very limited and confined principally to the drier districts, and in those districts, only round the edges of the forest and grass lands.

IN TRAVANCORE

at low dry elevations I saw much damage done to coffee, in fact every other tree suffering from the ravages of what was said to be the same borer as ours. A coffee expert introduced to me by the manager of one of our local companies assured me the Indian borer is the larva of a *fly* ! Query, is this so ! ?

Well, to proceed with our borer, the beetle is a dirty slate colour, not numerous by any means in its natural element, for it is rarely met with. This is no doubt accounted for by the bush fires destroying the beetles, when they are fully formed or nearly so and ready to fly in October and November but still confined in the cavity of woody fibre, in which they remain for about three months, being changed from the grub to the beetle ; besides, natural enemies in the forests and grass lands evidently keep the number limited.

As there are no bush fires on a coffee estate and few if any natural enemies the stag beetle finds a luxurious and very

COMFORTABLE HOME FOR PROPAGATING,

feeding on the bark ; the grub, boring in the wood and making its nest in the stem of the coffee and emerges thence a full-fledged beetle in the course of 12 months, and in the course of a few years they become so numerous (for each female lays from six to seven eggs) that a regular nursery is made of a coffee plantation till you can gather a hatful of the beetles in the course of an hour, and the ravages of the borer become so great, that an estate may be abandoned in the course of 8 or 10 years, unless steps are taken to save it. The earlier this work is attended to on a plantation the better for the owner. I therefore consider it worthy of my time to tell my fellow planters, who may know nothing of the ravages of the borer in B. C. A., how to prevent the great amount of damage done, which only becomes visible after years of labour in bringing a coffee tree to its prime, and supplying a breeding garden for longicorn beetles and their larvæ.

DURING THE FIRST YEAR'S WORK

on a coffee estate the planter need not trouble about borer, beginning work say in June and planting up in February, the beetles only being in existence from say 20th November to 20th February (for they only live three months) they are never seen on a new clearing.

The second year when the plants are about 20 inches to three feet high the trouble begins, and not later than 15th November a few boys, according to acreage should be told off to search for beetles, and go over the garden, marching up and down line after line of coffee daily, to the end of the beetle season in February-March ; the boys usually bring in one or two each daily, all through the season, and a young planter will crow and say " Now I have saved so many coffee trees and not a borer exists on my estate"; but he is mistaken. The borer beetle

NEVER FLIES DURING THE DAY-TIME

unless tormented till it is obliged to take to its wings, but sits quietly feeding off the coffee bark, usually on the sunny side of the plant, till dusk. It then flies off to another and another tree, visiting several, perhaps, during the one night and the habit seems to be to lay an egg in the soil, by making a small cavity near the stem at the bottom of the tree. I however am open to correction as I have never found an egg either on the ground or on the tree, although I have found many a beetle on the coffee trees and searched for eggs. Boys however assert that the eggs are laid in the ground and as it is the natural habit of the beetle family to lay eggs in the ground, I believe them. Only *one* egg seems to be laid at or near each coffee tree by one beetle, although others may lay in the same place ; for when the beetles become numerous on old plantations three or four grubs may be found on one stem of a coffee tree. I have not however found more than one borer in each tree during the first year, and usually two or three affected trees appear where a beetle has been caught.

On old properties where coffee is riddled with borer I have seen boys gather a hat-ful of beetles in a

day, and I myself have picked off as many as half-a-dozen from a coffee tree (so this proves how numerous they are) just after the first heavy rains in November and it is alarming to think of the amount of damage done if no steps are taken to check this pest.

AFTER THE BEETLES HAVE DISAPPEARED,

signs of their presence begin to show by a change of colour in the foliage of a few plants where each beetle (if a female) has been caught, the leaves of the plants turning from a deep green to a light yellow. The searchers must continue their good work, but now armed with a foot length of fine wire, and a knife, going regularly over the estate as before (the boys must be visited daily, watched, and carefully instructed at their work or they will do as much damage as the borer by cutting the trees &c.) It will be found on examination of the trees attacked that the grub, at least for one or two months, does not enter the wood of the plant, but works at the bark, sheltering itself from any natural enemies by a covering of refuse fibre made from the bark and ringing the tree, working first one way, and then another, feeding on the inner bark till a complete circle is made; it is then the signs of an attacked tree become visible; the flow of sap being completely cut off. At this stage many grub can be caught, and when the trees are furred up, they often recover. I make it a rule however to put in a supply beside all doubtful plants. Many grub

ESCAPE DETECTION

at this time, but by keeping the searchers at work going over the estate, and again later on, when the borer manages to enter the wood, the sawdust appears and a wire must be pushed into its hole to kill it. It can be seen that it is squashed by rubbing the point of the wire across the back of the hand, when mucilage matter will be found on the wire, if it is killed. The grub is sometimes difficult to get at as it sometimes makes a crooked tunnel, in which case the tree has to be cut to get at it It is frequently found that a borer goes down the stem, after entering the wood, into the ground; in this case it is difficult to get at, and the tree is usually destroyed by the roots blackening and dying right away, whereas when attacked above the ground there is every chance of recovery, if taken in time.

Borer enters the chrysalis stage about the end of July or early in August, but an odd one is to be found later than this. So that you are practically at work about seven months at borer beetles and grub, from December to June, both months inclusive. Any extra care and attention by planters to this most important of all works on coffee estates in B.C.A. will repay them. In addition to

REGULAR SEARCHERS FOR BORER

it is not a bad plan to give a little salt or other trifling reward to the ordinary workers, weeders for instance, during the season for any beetles they may secure in their line of work; but care must be taken that they don't leave their work to go off in search of them.

The borer beetle is well known on a coffee estate by the name "Nyanza," or horned beetle, and the larva as budzi.

I was informed, when in India, that when coffee trees get old and hard-wooded they are impervious to the attack of borer grub. This may be the case there; but I am quite certain that eight-years-old coffee if neglected is attacked with the insect here; but I think the older the coffee trees become the less likely they are to succumb to an attack of borer, and I am quite sure on a badly attacked estate that three or four years old coffee suffers most, especially in a very dry year. This may be partly due to heavy cropping at this age.

Of course, diseased leaves are partly caused by borer; as the lateral roots die off, the primary roots turn black and diseased, and as the root surface diminishes the foliage and branches lack in nourishment; and as a natural consequence, through loss of health and vigour, the tree with its fruit becomes diseased, if it does not all together perish.—Yours truly,

H. B.

RUBBER IN MEXICO:

INDIAN MODE OF PREPARING RUBBER FROM "CASTILLOA ELASTICA."

Mexico, 12th March 1901.

DEAR SIR,—The following method of preparing rubber by the Mexican Indians, which was quite new to me, may be of interest to you and your readers:—"On taking over charge of this (Hacienda) last August, I found scattered through the coffee fields some 25 or 30 rubber trees (*castilloa elastica*) of different ages and sizes and all much the worse for barbarous tapping in years past. Some Indians asked me if they might tap the trees on shares, and considering them of no value I allowed them to do so. They proceeded leisurely to work and in a few days brought me to the house three old kerosine oil cans of rubber milk and an armful of a jungle creeper called by them 'Amole bejuco' but which I have since had identified at Kew as *Ypomœa* (*colonyclion*) *Bonanox L.* They asked for an old soap-box and proceeded to pound the creeper with a stone, putting about double handfuls of the crushed creepers into five gallons water, they then poured some five gallons rubber milk into the box and two gallons or so of the water, stirred it for a moment or two and in less than 10 minutes took from the box a slab of white rubber 34 by 16 by 6 inches, poured away the water left and proceeded as before until they had four large slabs of rubber. These they split in two and hung in the sun, and in a day or two it turned black. The nett result of rubber was 53 lb, which sold in Vera Cruz for 95 cents (say two shillings) per lb, or $50·35. Had I employed my own peons to do the work at 62½ cents per day, the cost of producing the rubber would have been about $6·25 silver. In a regular rubber plantation of course it would have cost a little less, as these trees were scattered about.

—Yours truly, E. O. DARLEY.

TEA FOR THE MILLIONS IN INDIA AND CEYLON: A PACKET COMPANY WANTED.

DEAR SIR,—I was glad to hear that the I. T. A. had, at last, begun to take action in trying to secure a local market for their teas, but are they going the right way about it? They seem to be still under the impression that the natives will only buy the cheap low-grade teas. This is a great mistake. When trying to sell tea to the natives some years ago, I found that rich natives and even fairly well-to-do traders always preferred to buy the very best tea though at the time Orange Pekoe was R2 per lb., while the Muhammadans wanted green tea. The natives are all fond of tea and the poorest of them spend more in arrack, bhang or other stimulants than they need ever spend in tea; but to win this market it is necessary to pack the teas in very small packets, a 4 oz. packet is the biggest that would sell well, one and two ounce packets would have a far better chance.

Planters could not be expected to make up these tiny packets at the factory. They have enough trouble with larger packages; what is wanted is to start a Company who would buy their teas in the open market and put it up in small packets and distribute them by means of Commission Agents in every native bazaar. The Company would need liberal support from the I. T. A. for the first year or two, after which

they would probably be able to stand alone. There should be no difficulty in raising such a Company, as I should imagine every planter in India would be glad to take a share. The packets should consist of at least 20 per cent of the finest tea and a fair proportion of commons. Then there is the green tea trade with Persia and Afghanistan established years ago and which paid well even in those days when tea was selling at more than double its present value; this needs only a little pushing to develop enormously. I see they have just made up their minds to despatch a large caravan of tea to Persia; it is to be hoped that this will be Green and not Black Tea, as I know that neither Persians nor Afghans will drink black tea; and if the Indian planters send Black Tea there, they are bound to fail.

With regard to making a small packet, it is absurd to contend that this would be too costly and troublesome to pay. See how neatly even matches are packed and labelled. a properly arranged factory could turn out hundreds of thousands of these small packets daily; and the labels, which should be in the native languages, would cost a mere trifle to print owing to the number required. In many of the large cities, China Tea in neat little paper packets can be bought for a few pice and these constitute the chief supply, not only for the natives but Eurasian and poorer class Europeans who all prefer to get their daily requirement in this way rather than buy even a lb. of tea at a time. This is the sole reason why China Teas still continue to hold their own in India.

The I. T. A. would do well to devote their whole time and attention to developing the local market rather than waste their money in trying to capture foreign markets; it would cost less money than is re-required for America alone, and the possible results are practically unlimited. It would not be a matter for great surprise if, in a few years, India ceased to export tea; their total crop does not amount to 1 lb. per head of population, a rate of consumption already about in Ceylon.

I make no charge for the above, but if the I. P. A., after testing its value, should desire to express their gratitude by sending me a handsome bonus, I promise not to refuse it.

AN OLD EX I. P.

CACAO PODS AND SEED.

Dear Sir,—Will you kindly allow me space to comment on Mr. Carruthers' article on "Cacao Pods and Their Seed," appearing in your issue of the *Tropical Agriculturist* for April, of this year.

Mr. Carruthers' examination of a certain number of cocoa pods leads him to the conclusion that "the character and size and weight of the fruit do not afford any criterion of the weight of contained seed."

There is, however, one way in which recognition of a variety may well be made, namely, by *its name*, which, in connection with the diagrams of pods and their contents which you publish, has unhappily been omitted. This cannot but rob the table of half its interest, and all its utility. Will Mr. Carruthers be good enough to name his diagrams? Nos. 2 and 7 are presumably Forastero; but for all we know perhaps Nos. 1 and 20 are too, and in view of the great importance of sorting out and making known the more remunerative varieties of Forastero, I am surprised such an obvious sign-post as a plant's name should have been omitted—doubtless by oversight.—Yours &c.,

POD.

P.S.—In reference to your Editorial note on my cocoa letter, I was not aware "that *hemileia vastatrix* first appeared on young coffee which had never been manured, but was growing near jungle where the fungus had its habitat." In this case the 'dirt' was generated in the jungle. and not therefore through drastic manuring. But drastic manuring—the suggestion is not original—may have had a hand in nursing the fungus elsewhere, may it not? Further, from the extract you quote from Berthelink, is it implied in the sentence "have not only not lost a jot of their original value, but have rather increased in productiveness" that the original cacao trees are still living? If this is so, local conditions must have changed everything; and that certain varieties of cocoa greatly vary in behaviour even in this island's localities seems to point to a very sensitive appreciation of surroundings in the cacao tree.—P.

[Any treatment that left coffee weak or played-out undoubtedly made it an easy prey to the fungus when once it had found its way all over our coffee country.—The rich deep cacao-growing soil of Dutch Guiana is, we suspect, without parallel in any part of Ceylon.—Ed. *T.A.*]

TEA CULTIVATION AND MANUFACTURE IN SOUTH CAROLINA.

17th April, 1901.

(*By a Ceylon Planter*).

Dear Sir,—Ten years have elapsed since I assisted Dr Shephard, the proprietor of Pinehurst, Summerville, sixteen miles from Charleston, s c.

The acreage then under tea was only twelve acres in patches, all doing remarkably well and looking very promising. There was also a small Government tea garden located near a lagoon and Dr S advised me to leave it alone as it was considered unhealthy.

However, I was very keen on restoring to cultivation the Government patch of tea and should have applied to Washington, had I not been employed by Dr Shephard who through correspondence with Mr Reed, tea merchant of 13th street, Philadelphia, engaged me as a tea expert to make an improvement in the manufacture of Pinehurst teas. Through Mr Reed I was engaged for one hundred and fifty dollars or £30 for one week's work and gave Dr Shephard material assistance. I went round from New York by steamer and met Dr Shephard at Charleston.

The first question I put to him was—Have you got any sieves for grading your teas; his reply was "*not one sieve*"; so we went immediately to the Ironmongers in Charleston and purchased wire work of Nos. 16, 14, 12, 10 and 4 mesh. We then took train to Summerville, carrying the rolls of wire with us, and the estate carpenter made the sieves according to my instructions. Dr. Shephard made me very comfortable in his beautiful house surrounded by one of the most valuable botanical gardens in the world. For I must tell you Dr. S. is a botanist of no mean order. Roses from all parts of the world, flowers, shrubs, ornamental trees, both indigenous and exotic, tastefully arranged, a list of which I possess and will send you some day when settled down. The largest rose bush in the world was growing over Dr. S.'s house in Meeting Street, Charleston, the stem as thick as a man's body and climbing over the roof of the house, festoons of

beautiful large white roses hanging round the walls and over the arches and gate-way. I have a photograph of this gigantic rose, which you shall also see at some future time. But to return to tea, there was a good golden flush ready for plucking.

Our pluckers were little boys and girls from Dr. S's mixed school on Pinehurst and, when called upon to pluck tea leaf, the young lady governess promptly attended with red silk umbrella to supervise the field work; the writer had occasion to call them to order sometimes and to pluck finer. The result was, the plucking was a success, and the leaf brought in withered the same evening. Every available room and the staircase was used for withering. I told Dr. S. to have it well withered; next day we got some sturdy negroes to hand roll and ferment, and we fired it with an American evaporator.

Our temperature was 180° and, after sifting the roll, I reduced the temperature to save the golden tips; and Dr. S. lent me 16 silk handkerchiefs to save them from burning and disappearing. This was a great point gained, and our first chest of tea was a fine sample. The No. 1 Flowery Pekoe and Orange Pekoe were sent to Washington. Dr. Shepherd's sister being a Senator's wife and interested in the Pinehurst Tea enterprise, helped to bring the tea into notice and Mr Reed's reports at Philadelphia made it a name in the American markets.

I am glad to mention it was very favourably reported upon in both New York and in London.

Dr. Shephard was very pleased with my work and we remained in the tea house until 1 o'clock in the morning to finish our work. It was a pleasure to me to work for a man like Dr. Shephard, a perfect gentleman in all respects and a very clever man, not only on botanical subjects and tropical agriculture, but upon mining subjects and the analysis of soils and minerals.

When writing up my instructions for cultivation and manufacture I found it necessary to gain some information regarding climate, temperature, and *average rainfall.*

Accordingly I took a letter of introduction to the Government officials and made extracts from their Government statistics for twenty years in South Carolina. The result of my extracts proved that the rainfall average for twenty years was only sixty-two inches, little more than half the quantity of rain required to make the tea enterprise a success commercially in South Carolina, and in this respect Dr. Shephard quite agreed with me that tea would not pay well on a large scale, whereas irrigation could be applied to a small area; then again, there are the cold months with cold winds checking the growth.

Several other people were growing tea on their farms in Carolina; some of them placed themselves in correspondence with me.

It was very encouraging to Dr. Shephard to obtain tea seed from all parts of the world through the Washington Government and make his selections from the best Assam-Hybrid jats. We spent a considerable number of hours in selecting seed bearers and tied pieces of silk ribbon round the stems of those to be reserved, so that the pluckers should pass them over. Some of the leaves on three-year-old bushes were as large as a man's hand and very strongly embossed.

I gave Dr. Shephard the addresses of both Colombo and Calcutta firms who supplied reliable tea-seed and told him it would be well packed. Some of the shipments from China and Japan arrived in bad order. Dr. Shephard had a nursery of thriving tea plants raised from imported seed, but I told him to select only Hybrid-Assam to get uniform fields of tea and large crops of leaf of good quality.

The Government tea plantation was a low China jat, though the bushes were large and required a good pruning. I believe I pruned a few of those bushes in June, 1891.

The people of the United States are fond of green teas and buy nearly the whole of the Japanese crop of 50,000,000 lb. (fifty millions). They like young Hyson mixed with black.

The best black teas are called *English Breakfast* and, when working with Mr McCombie Murray (late of Ceylon) in Philadelphia, I did a packet trade with customers at German Town, about 15 miles from Philadelphia city. When the very hot weather set in, my "English Breakfast" customers went to the sea-side, my tea business suddenly collapsed, and I had to write up about "Elephants" in the Philadelphia Press to keep from starving; then Dr. Shephard sent for me, and all was well that ended well.

Great interests are often involved in trifles and this was a remarkable instance. When tasting some teas for Mr Reed in 13th Street, Philadelphia, my eye rested on a small picture on the wall. I said to Mr Reed, "that looks like a plantation." "Yes," he said. "That is Pinehurst Tea plantation at Summerville, South Carolina, the property of Dr. Shephard." "What!" I said, "tea growing in the Southern States: *you don't say.*" "Yes," said Mr Reed, "*That's so* and I value his teas." "What would it cost to go down South?" said I, "it interests me." Mr Reed said he would write to Dr. Shephard and arrange for my visit, which he did, to our mutual satisfaction and benefit. I am glad cultivation has been extended and one dollar per pound paid for Pinehurst Tea.—Yours faithfully,

HENRY COTTAM.

EUCALYPTUS RESINIFERA.—Some two years ago, in the course of some most interesting and luminous letters from Rome, the Rev. H Ewbank told us that the Italian authorities recommended this species as the hardiest and most reliable of the species. Mr Ewbank obtained seed, distributed some and grew others. Five young seedlings were planted out last year near Ryde, Isle of Wight, and all five have so far got through the winter safely without any protection, whilst E ficifolia, on which great hopes had been based, has been severely injured by frost.—*Gardeners' Chronicle*, April 6.

IMITATION CINNAMON.—The *British Food Journal* calls attention to the "manufacture" of imitation cinnamon. The adulterant used for cinnamon is guava, or jungle bark, which costs about sixpence per pound in Colombo. This bark is carefully peeled, prepared and dried like cinnamon, and closely resembles it in appearance. The sweet odour, and the still sweeter taste, peculiar to cinnamon, are obtained by immersion for a few hours in large tubs of waste from the distillation of cinnamon oil, and afterwards, when dry, by touching the end of each bundle of the false guava pipes with a cloth saturated with cheap cinnamon oil.

THE KANDYAN HILLS COMPANY, LTD.

The report is as follows :—

ACREAGE STATEMENT :

Tea in full bearing	352 acres
Partial „	58 „
Planted in 1900	25 „
	435 acres
Cocoa	90 „
Reserve Land	785 „
Total	1,310 acres

The Directors beg to present their report for season ended 31st December, 1900, together with a duly audited statement of accounts for the same period.

The tea crop, including bought leaf, amounted to 227,611 lb ; and we secured 130 cwt of cocoa.

The tea gathered from the Estate itself was 182,013 lb, an advance of 22,013 lb over estimate, while the bought leaf represented 45,598, a total of 227,611 lb ; the two together costing 24·73 cts per lb to produce.

Taking Pansalatenne alone, the cost of placing the tea on the market was 22·27 cts per lb including 2·31 cts a lb for manure.

Prices were fairly good until the close of the year, when, with a large quantity of tea to sell, the market became greatly depressed, the results being a serious falling off in receipts, which has affected the profits on the season's working.

The surplus, after meeting all estate expenditure, represents a sum of R12,300·55, and after paying interest and other charges and providing a sum of R3,809·66 for depreciation, there remains a balance of R1,414·38, which the Directors recommend being carried forward to the new year.

During the season under review a sum of R15,970·87 has been spent on a Pelton Wheel Installation and other improvements to the factory, and R4,427·07 on the planting and upkeep of young tea. No further extensions are at present contemplated, and it is thought that the factory is now sufficiently equipped for the crops of the near future.

The new season's estimate of expenditure is based on a crop of 200,000 lb of tea at a cost of R43,481, including R1,800 for manure and 130 cwts. cocoa costing R3,760.

Mr. Edward S Grigson retires from the Board of Directors by rotation, but is eligible for re-election.

The appointment of an Auditor rests with the meeting.

THE TYSPANE TEA COMPANY, LIMITED.

THE REPORT.

To be presented at the fifth ordinary annual general meeting of the Tyspane Tea Company, Limited, to be held at the offices of the Company, 12, Fenchurch Street, London, E.C., on Wednesday, 10th April, 1901, at 2-30 p.m.

The Directors have the pleasure to submit the Balance Sheet and Accounts of the Company for the year ending 31st December 1900, duly audited.

With the deepest regret the Directors record the great loss that the Company has sustained through the death of Mr Walter Sandys Thomas, late Managing Director in Ceylon.

Compared with last year, the Profit and Loss Account shews increased expenditure and reduced receipts, but the former includes the sum of about £720 spent on Factory extension and up-keep of new clearings, which might legitimately have been charged to Capital instead of Revenue, had the Directors not deemed it inadvisable to do so in existing circumstances. The reduction in nett proceeds is due to the fall in the market value of medium teas.

The total crop amounted to 252,373 lb. Tea, which averaged 5·72d per lb. nett, against 258,370 lb. last year, netting 6·24d per lb.

Exchange averaged 1/4 5-16th per Rupee against 1/4 23-64th last year.

The Net Profit for the year, after payment of the Interest on Debentures, is	£501 11 11	
To which has to be added the balance brought forward from last year of	214 15 4	
		£716 7 3
The Directors propose to pay a Dividend of three per cent, requiring ..	540 0 0	
And to carry forward ..	176 7 3	
		£716 7 3

Mr John Philip Herringham, the retiring Director offers himself for re-election. The Auditor, Mr J Hamilton Alston, also offers himself for re-election. —By order of the Board, ROBERTSON BOIS & Co., Agents and Secretaries.

London, 1st April, 1901.

The acreage of the Estates is as follows :—

Tea in bearing	...	..687 acres
Tea in partial bearing	..	... 6 do
Tea planted in 1896	..	... 47 do
do do 1897	..	... 10 do
do do 1898	..	... 28 do
do do 1899	..	.. 4 do
Timber clearings	...	... 22 do
Jungle	...	} 164 do
Scrub, &c.	..	do
		968

KELANI VALLEY TEA ASSOCIATION, LIMITED.

Report of the Board of Directors. To be presented to the Shareholders at the Fifteenth Ordinary General Meeting, to be held at the Office of the Company, on Monday, 15th April, 1901, at 12 noon.

The Directors beg to submit to the Shareholders the Report and Accounts of the Company, duly audited, for the year ending 31st December, 1900.

The total crops from the Company's four Estates amounted to 662,248 lb. against 575 255 lb. in 1899 ; the average price realised was 5·794d per lb., against 7d., and the average rate of exchange was 1s 4 27-64d as compared with 1s 4 25-64d for the previous year.

Owing to the very depressed condition of the Tea Market during the last six months of the past season, the profit earned for the year under review compares most unfavourably with that secured in previous years, but, with an improving Market, a natural shortfall in crops, and the steps now being generally taken to further reduce output and improve quality, your Directors have good reason to expect that very different results will be shewn for the current, and, it is to be hoped, succeeding seasons.

Including £419 2s 5 brought forward from 1899, the net profit for the past year amounts to £1,019 14s., from which has to deducted the Interim Dividend of 3 per cent., £562 19s paid in September last, leaving £456 15s., available, and this sum is proposed to carry forward to next season's account.

Debentures to the amount of £2,100 which matured on the 1st January, 1901, have been renewed for a further period of five years at 5 per cent per annum.

Two vacancies have occurred on the Board, one caused by the resignation of the Hon. D A C Scott, on account of ill-health, the other by the regretted death of Mr. Donald Andrew.

It is not proposed at present to fill the first-named vacancy, but, to occupy the seat of their deceased colleague, Mr. Donald Andrew, your Directors have appointed Mr. George Gray Anderson, who, in accord-

ance with the Articles of Association, retires from the Board at this time, and being eligible, offers himself for re-election. Mr. J B Laurie, C.A., also offers himself for re-election as Auditor.

G W PAINE, Chairman.

16, Philpot Lane, London, E.C., 3rd April, 1901.

THE BALMORAL (CEYLON) ESTATES COMPANY, LTD.

REPORT.—To be presented at the Third Annual General Meeting of the Balmoral (Ceylon) Estates Company, Limited, to be held at the Offices of the Company, 12, Fenchurch Street, E.C., on Thursday, 11th April, at 2·30 p.m.

The Directors have the pleasure to submit the Balance Sheet and Accounts of the Company for the year ending 31st December, 1900, duly audited.

The total yield of Tea was 563.556 lb. against 528,804 lb. last year, being at the rate of 606 lb. per acre all round; the cost of production, exclusive of Capital Expenditure, was 26 cents per lb free on board at Colombo, and the gross average price obtained was 8·86d per lb. against 9·47d per lb. last year—Sandringham Teas averaging 8·90d and Clydesdale 8·81d per lb. Exchange has averaged throughout the year 1s 4¼d against 1s 4 19-64d last year.

The Net Profit for the year amounts to ...	£7,767 3 7	
And the Balance from last year to ..	1,152 14 5	
Making a total of ..	..	£8,919 18 0
The Directors have already paid out of this Dividends on the 6 per cent. Preference Shares for the year ending 31st Dec., 1900 ...	£1,800 0 0	
Interim Dividend on the Ordinary Shares of 5 per cent. free of Income Tax..	2,601 15 0	
Income Tax ...	152 16 8	
AND IT IS PROPOSED :—		
To pay a Dividend of 7 per cent. free of Income Tax on the Ordinary Shares, making 12 per cent. for the year ..	3,642 9 0	
And to carry forward the Balance of ...	722 17 4	
		£8,919 18 0

The Auditor, Mr. J. HAMILTON ALSTON, offers himself for re-election. By Order of the Board, C. G. BOIS, London, 2nd April, 1901. Joint Secretary.

SCHEDULE OF THE COMPANY'S ESTATES.

	Tea. Full Bearing	Partial Bearing	Not in Bearing	Grass, Patana, &c.	Total.
Sandringham and Yarravale ..	526	—	4	12	543
Balmoral and Clydesdale ..	402	35	1	170	626
Acres ...	929	35	23	182	1,169

RUBBER IN N. E. RHODESIA.—The rubber district round the southern end of Lake Bangweolo has been largely devastated through the vandalism of the natives, carelessness in the method of gathering, and the wholesale destruction of the plant in search of the root-rubber. On the Loangwe, near Molilo, Mr Highfield, a former resident of Salisbury, is farming and planting Brazilian rubber.—*Chemist and Druggist*, March 30.

PLANTING NOTES.

EXTRACTION OF CRUDE INDIA-RUBBER.—Patent No. 9906, 1900. Date of Application, 29th May, 1900. Accepted, 23rd February, 1901. A L Arnaud, 35 Rue de l'Arbalete ; A V L Verneuil, 25 Rue Humboldt ; A M G Wehry, 16 Rue Raffet ; and A G Lebeuf, 4 Impasse Giradon—all in Paris.—*Home paper.*

MALAYS BUSY WITH GUTTA IN SARAWAK.—At Sadong, in Sarawak, Malays are unusually busy in collecting "Jelutong" gutta. Instead of the usual wasteful method of felling the trees, these Malays tap the bark about four feet from the ground. Two of their employers are the sole possessors, at least in that district, of a secret for refining this "jelutong" gutta and producing a gutta of high quality, for which they hope to obtain large prices in Singapore.—*Straits Times*, April 17.

CAMPHOR CULTIVATION.—Having ourselves been moving for some time past to secure a fair trial of camphor cultivation in the island, we are interested to find in an Indian paper that in view of the increasing price of camphor a German firm has suggested India and Ceylon as suitable countries for cultivating the camphor tree. The world's requirements of camphor are estimated at 10,400,000 lb. per annum ; of this, under the new administration, about 5,200,000 lb, will be supplied by Formosa, while about one-third of the whole will be exported from Japan, leaving a diminution in the exports, compared with 1898, of about 3,640,000 lb.

TEA-GROWING IN CAROLINA, UNITED STATES.—We call attention to the interesting account, given on page 787, of Dr. Shephard's attempt at tea culture near Charleston, by Mr. Henry Cottam, who did much to show him the proper mode of manufacture as well as of cultivation. It is a curious fact that, while Ceylon proprietors are lavishing their money to try and win the American and Russian markets for its teas, a Ceylon planter should have started tea growing in Carolina on its right course, while another is at this moment trying to show the tea managers for Messrs. Popoff at Batoum the way "how to do it."

BOUVARDIAS: OF THE CINCHONA FAMILY.—It may interest gardeners in this country to learn that Mr A C Rolt, of Kissengunj, has succeeded in growing these beautiful plants in his garden in Eastern Bengal. The genus is a native of Mexico, but several fine hybrids have been raised at home. The plants belong to the natural order *Rubiaceæ* of the Cinchona family), and the flowers resemble those of the Ixora in character and form of inflorescence. In fact, a bunch of Bouvardia flowers may be easily mistaken for a bunch of Ixora blooms. They are extremely difficult to grow on the plains of India; and that Mr Rolt has succeeded in growing them says much for his skill as a gardener. He writes to us on 4th instant:—"My Bouvardias, which never flowered before, are just coming into bloom. They grow very strong with me, but have not hitherto flowered. This year, however, they are full of buds. Bouvardias on the plains of India are, I suppose, something quite new." On the hills, and notably on the Nilgiris, these plants should grow and flower most luxuriantly.—*Indian Gardening and Planting*, April 11.

OUR STAPLE EXPORTS:

TEA *vs.* COCONUTS.

It is curious to note the widely different positions our two principal staples of Export have occupied during the first quarter of the current year. Tea had dropped in price to a point which had never before been touched, and which we sincerely hope will never again be experienced ; while the remedy for the depression, caused by overproduction, was yet in the future. True, the past few weeks have seen an appreciable advance in price; but the reduced output, by whatever means to be accomplished, has yet to be arranged for, although it is well-known that an unusual quantity of last year's tea entered into our January's shipments. Still, whether an actual reduction will be realized is a question, now that prices have risen and are keeping up, and that so many Companies have refused to give their support to any scheme for reduced exports. But that is not the question we wish to discuss now. What we desire to point out is that, while Tea Exports have risen, and while prices were disappointing during the first quarter of the year, the out-turn of Coconut products, on the other hand, show a falling-off in quantity to the accompaniment of high prices maintained for an exceptionally long period.

We had thought, on the authority of published reports and the forecasts of our own correspondents, that the effects of the drought of 1899 on the Cocount palm would cease to be apparent after the end of 1900, and that the current year would show an advance in Exports. That expectation has not yet been realised ; but, not to travel out of the first quarter, the following are the figures which the Chamber of Commerce returns up to 1st April show (for the first quarter) :—Of Coconut Oil, there were sent away 62,286 cwts., against over 102,000 cwt. the previous year and over 82,000 cwt. the two years preceding; of Copra 57,034 cwt. against 111,585 in 1900, and 68,900 and 69,275 cwt. in 1899 and 1898 respectively. In desiccated nuts too, there is a falling-off from over 2,800,000 lbs, 2,700,000 and 2,300,000 lbs in the three previous years to 2½ millions this year. Poonac, with 17,952 cwt, shows the largest proportional decrease, being less than half the quantity sent away in each of the two years immediately preceding, and less than one-fourth of the exports for 1898. Only in Coconuts in the shell is there an increase, with over 3½ millions in nuts against less than 2½ millions in each of the three years preceding ; but this increase of a million nuts represents but a fraction of the deficit we have noted under the several important heads given above. The interpretation of these figures is that the expectation that this year's crops will compensate for the deficiency of last year has not yet been fulfilled. We do not say it will not be fulfilled, for we hear from many sides of the promise of very heavy pluckings during the next two crops ; but even March and April crops have been disappointing in many places. The fact is that the Coconut palm in a congenial climate can scarcely get too much rain ; while it is specially affected by drought, and the longer the latter lasts, the more prolonged the effect on the crops of nuts. Meanwhile the demand for Copra is keen, the prices keeping up to close on R 52 per Candy for "best"; and the Desiccating Mills may have to work short time until the coming big crops lower prices and render a large supply of nuts available.

"SPORT IN THE LOW-COUNTRY OF CEYLON":

BY ALFRED CLARK.*

The reading of this little book has afforded me much pleasure, and, as those portions of it that I consider myself qualified to criticise appear to me to be absolutely correct, I can only suppose that the remainder of the work is equally trustworthy. Being fond of sport, and having frequently visited the low-country of Ceylon, I had begun to fancy that I knew a good deal about the manners and customs of the fauna of its jungle; but, after reading Mr. Clark's book, I am ready to admit that my knowledge thereof, as compared with his, is woefully incomplete. I can therefore conscientiously recommend any one, really a sportsman at heart, who intends making a trip to the lowcountry of Ceylon after game, to provide himself with a copy of Mr. Clark's book, as it will be found not only to contain useful hints] on Sport, and on the characteristics of the wild animals, but also a brief account of the game laws. The chapters on elephants are specially interesting, although shrouded by what I fear is the not too pessimistic view that 2,000 is probably the sum-total of wild elephants now in the island. The greatest number I ever saw on the hills, in a herd, was eight, and these lived for many months on the top of the range above Rangalla. Near the ruins of Pollonnaruwa, however, I saw about 40 together, and these figures seem to corroborate Mr. Clark's experience. I was glad to read that the author's opinion is that "in spite of the thousands killed every year, there is no reason to think that snipe are less numerous now than they were formerly." When I recall the tremendous bags the planters of Rangalla and Medamahanuwara were wont to make, in the paddy-fields of Bintenne, I would not have been surprised to learn that they had become as scarce as that less palatable bird the dodo ! If sportsmen in Ceylon are as keen as they were twenty years ago, I prophesy that Mr. Clark's book will in future as certainly be a part of the furnishing of their bungalows, as "The Directory" has always been.

COSMOPOLITE.

SIR JOHN MURRAY'S EXPEDITION TO CHRISTMAS ISLAND.

Sir John Murray, who has just returned from a six months' expedition to Christmas Island, during which he crossed the island from end to end—the first occasion on which it has been traversed—has made a statement with reference to his travels to a represent-

* Published at "*Ceylon Observer*" Office, 1901.

ative of Reuter's Agency.—Christmas Island, which is situated in the Indian Ocean, is 220 miles from the nearest land, and is some 12 miles long by seven broad. It is covered with dense forest, having an area of nearly 50 miles, and the sea depth around its shores is between three and four miles. There is no good anchorage, but only an open roadstead When Sir John Murray was on the island there were 13 whites, including a doctor, a chemist, and an engineer, living there with their families, together with 720 Indian coolies engaged in working the rich phosphate deposits. The animals and plants on the island are of extreme interest. The whole place is overrun with curious red crabs as much as 18 inches across. They are excellent tree climbers, and once a year there is a regular migration of these crustaceans, who travel in bodies like ants, taking 15 days on the journey, and returning inland after hatching their eggs. There are only five mammals on the island, including two species of rat not known elsewhere. They are of two colours, those on the plateau being brown, while those nearer the coast are black, and in order to keep them down a number of terriers have been imported. On the island are also to be found a toothless snake and a blind snake much like a worm. In exploring the island Sir John Murray had to cut a track through the dense forest until he reached the central plateau at an altitude of 1,000 feet, where travelling was not so difficult. One night he got lost in the forest, and had to subsist on the tops of sago palms, which he cut down. The island is under the Straits Settlements Government, and a resident magistrate has just been despatched thither from Singapore, together with an official of the Public Works Department, a scientific commission, and a force of police, 35 in all. They will select sites for the administrative buildings to be erected on the island. The climate is perfect, like a hot English summer, and prior to the British annexation no human being is supposed to have lived on the island.—London *Times*, April 1.

RUBBER FROM THE HULE PLANT IN MEXICO.

A process for extracting rubber from the Hule plant was discovered about a year ago by a Mexican doctor residing in Sierra Mojado. This plant, which contains about forty per cent of rubber, grows in the mountainous district of Mexico, as well as in certain localities of Texas, Wyoming and Nebraska. It is a species of sage bush, with small leaves and grows to a height of about three 3 feet. A patent on the process has been taken out in the United States of Mexico, and a manufacturing plant has been located at San Luis, Potosi. All the machinery for use in extracting the rubber has been invented and patented in both countries by the Monterey Foundry and Manufacturing Company, Monterey. The principal steps in the process of manufacture are as follows: —There are special machines which feed the plant automatically into the cutters; after it comes out of the machines, it is carried by a bucket elevator and dumped into steam-jacketed mixing tanks containing certain chemicals; the product then runs by gravity into hydraulic filter presses after which it is subjected to hydrostatic pressure of seventy-five pounds to the square inch; it is then conveyed into settling tanks where the gum being heavier settles at the bottom, while the chemicals and residue are drawn off. The cost of production is slight. The principal difficulty to be overcome is the high freight rate, a box-car being quickly filled on account of the lightness and bulkiness of the plant.—*India Rubber Trades' Journal.*

A GOOD BUNCH OF BANANAS.

A correspondent writes:—The enclosed is a Banana grown in my garden. Will you kindly give me your opinion about it? I cannot find any so large in the fruiterers' shops about here. The bunch weighs 57 lb. I cannot count the number of fruits nearer than 160. The enclosed is not one of the largest fruits.—J. J.

[The fruit sent by our subscriber tasted remarkably well, having a rich mellow flavour; and his bunch certainly shows good culture. Many larger bunches of fruit, however, are known, and we would refer "J. J." to the "Impney" bunch, which, so far as we know, is a record one, whose weight was one hundred and fourteen pounds (exactly double the weight of "J. J.'s") and contained 283 "fingers." See *Journal of Horticulture* for May 26th, 1898, where an illustration of the "Impney" bunch is given.—ED.]—*Journal of Horticulture*, March 21.

CAPE TO CAIRO.

COFFEE-PLANTING IN NYASSALAND.

(From *The Daily Telegraph* Commissioner, Mr Lionel Decle.)

This territory of the British Chartered Company owes its importance as a Colony to coffee-planting, which is yearly assuming more importance, and Nyassaland coffee is of so superior a quality that it commands the highest price on the London market, where it has fetched treble the sum paid for Brazil coffee. There are in Nyassaland about 10,000 acres of land

UNDER COFFEE,

all of which is not, however, in bearing; and the last crop is estimated at 1,100 tons, an enormous amount if one considers that the plantations date only from ten years back. The industry traces its origin to Mr Buchanan, a Scotch gardener attached to the Blantyre Mission, who brought out from Scotland a coffee plant, and it is almost exclusively from this single plant that all the millions of coffee trees planted in the country have come. Land can only be procured now either from private holders or else from the Government. Uncultivated land can be purchased from the former at prices ranging from half-a-crown to 10s per acre, and from the Government at 5s to 7s per acre. Land under coffee ranges from £7 to £20 per acre for estates of 200 acres or more. An estate was recently sold for £6,000. It consisted of 300 acres of land under coffee, with 1,700 acres of forest land, with houses, buildings and machinery. All the planters with whom I have discussed the subject seem to agree upon the point that a small plantation of 150 acres will pay better if thoroughly cultivated than a plantation of 300 acres or more, on account of the labour conditions and of the difficulty of securing sufficient skilled assistance. Under this heading are included planters, sowers and pruners, as well as carpenters and bricklayers. Most of the skilled labour is supplied by the Ya, and in a smaller proportion by the Atonga, tribes. Un-

skilled labourers consist chiefly of Angoni from districts west of Lake Nyassa, and also of a few Angoni from Portuguese territory near Lake Shirwa and of Atonga, a tribe inhabiting the western shore of Lake Nyassa. This

LABOR QUESTION.

is a difficult one to solve, as the time when workers are chiefly required by planters, from November to March, is the very time when natives are reluctant to leave their homes, where they are wanted to cultivate their own fields. Unskilled labourers are paid at the rate of 3s to 4s a month, and skilled men get from 5s to £1 : but while the former come from long distances, the latter usually live in the villages forming part of the estates. Planters calculate that they require an average of two labourers per acre of cultivated land, so that 20,000 men are wanted to do justice to the land now under cultivation. Lack of assistance is the planter's incessant cry, and all of them greatly fear that the high wages paid in Southern Rhodesia may divert there the labourers. and cause a rise in the pay, which would kill the coffee industry. Planters, I think, exaggerated the danger, and I doubt whether the proposed railway from the south will cause a serious exodus of natives towards Southern Rhodesia, provided, however, that the planters treat their people better than they have done so far. Until now, it has been customary to allow the labourers, in addition to their pay, one yard of calico, equivalent to 3d, per week, for their food, but the natives within a radius of 200 miles from Blantyre will not sell food for calico. To obtain food the plantation labourers have to work on Saturday afternoons and on Sundays in the gardens belonging to the natives of the villages surrounding the plantations on which they are engaged, and in exchange for such work they receive a few cobs of corn, on which they have to subsist for the remainder of the week. In their own country such people are accustomed to eat meat, and cobs of corn are not sufficiently nourishing for them, so that the natives who go to work on the plantations usually return to their country in a state of semi-starvation. Sufficient rations would mean to the planters only an extra monthly expenditure of 1s. per head, and so long as labour does not cost more than five shillings per month, all told, plantations must pay handsomely. Most of the

PLANTATION LABOURERS HAVE TO WALK FROM FOUR TO SIX HUNDRED MILES

to come from their homes to the coffee-growing districts, and as much to return to their country. On the way they usually suffer from scarcity of food, and most of them are more or less exhausted by the journey, so that they cannot perform the amount of work which they might otherwise do. If the planters combined together they could easily get their men brought by steamer at a cost of two shillings and sixpence per head, which for four to five months' work usually supplied by these men would increase their cost by sixpence per month. If this were done the present scarcity of labour would soon cease to exist, and the danger of its being diverted south would not arise. At present the people who come to work for five months in Blantyre are away nine months from their homes, so that none of them return to work two years in succession. The high wages paid in Rhodesia do not constitute the attraction one would think to the Nyassaland natives. Most of those who have been to Salisbury, where they earned from one pound to thirty shillings a month, have returned without a penny, and they complained that everything was so expensive that they had been unable to save anything of their wages. It must also be noted that these people do not care to go so far away from their country among other natives, whose language they do not speak and whose babits are quite different from their own. Many planters, led by an irresponsible rag published in Blantyre, make a great fuss over the Administration allowing natives to leave the Protectorate. They forget that the Administration has no power to prevent individuals from leaving the country. Everything legally possible is done to discourage them. For instance, when a man applies for a pass to go outside the Protectorate, he must first show that he has paid his hut-tax, and must satisfy the collector that he has made provision for the support of his wife and family during his absence. But more cannot be done. Stringent regulations have been issued prohibiting the engagement by labour agents of natives to work outside the Protectorate, and in order to help the planters the Administrator has gone so far as to allow the natives to go and work in Blantyre, the first month's wages being collected by Government to cover the payment of the year's hut-tax. From Central Angoniland alone 9,000 natives went down to Blantyre last year on those terms. To close the subject, I can only say that, as I have shown, the planters hold the remedy in their own hands, to avoid the present scarcity of labour and to prevent the exodus they fear, and if they do not adopt it they will only have themselves to blame for the consequences.

FOUR YEARS IS THE TIME REQUIRED

for coffee to bring returns. Trees begin to bear at the end of three years, but a full crop is only gathered in the fourth year. I have tried to obtain estimates of the cost of a plantation, but no planters seem to agree as to figures. Some calculate that, until coffee has been brought into bearing, £12 will have been spent on each acre of land under cultivation, about £3 per year, the cost of land, buildings, and machinery, not being included in this calculation. After coffee has begun to bear, the cost per acre is estimated at 20s to £2 per acre, to which must be added the cost of porterage and transport to London and the salary of European assistants, one man being sufficient to look after 300 acres ; but above that amount an extra assistant is required for every further 150 acres. The returns vary considerably, according to the quality of the soil, manuring, and other causes. Some gardens only give 1 cwt per acre, while others have produced as much as 7 cwt. The average return may be calculated at 2½ cwt per acre, which, even at the present low price of coffee, ought to pay well. At the price of £60 per ton coffee should yield a profit of £40. The cost of porterage from the plantations to the navigable portion of the Shiré River varies from 30s to £2 per ton, according to the distance ; and 50s per ton is charged by the transport companies for the carriage by steamer to Chinde, at the mouth of the Zambesi, whence the freight to London comes to £3 per ton, or a total of about £7 10s. As I have already said, Nyassa coffee fetches the highest price on the London market, where it

has been sold for as much as £114 per ton. One of the difficulties planters have to contend with in this part of the world is the impossibility of borrowing money locally. Want of capital and lack of credit would prove fatal to most of them, if they met with two successive unproductive years. Fortunately for them, no leaf disease has yet made its appearance among Nyassa coffee, but there is an insect—a kind of bug, of the ladybird species—which causes spotted berries. If, however, they are collected in time, no great damage is done to the coffee. Early rains are the best for the plants, which require altogether about fifty inches of rain. Another difficulty planters have to meet is that of finding suitable

EUROPEAN ASSISTANTS.

Many of the young men who are sent out here are unsuited to their work. To be really useful an assistant should possess a good deal of practical knowledge; he should be able to show natives how to make and burn bricks, understand something of carpentering, and have had some experience in the management of animals. Young men having had some practical training on a farm are usually the most useful. It is true that they generally lack the knowledge of bookkeeping, which is one of the duties they have to perform. Assistants on plantations receive from £150 to £200 a year, with a house. Fifty pounds are sufficient to cover all their expenses. But their life is not a pleasant one. They are most of the time alone, and even supposing that they should have a neighbour within ten to twelve miles, their only means of conveyance is by machilla, a hammock carried by natives, a slow and disagreeable mode of locomotion. Horses are most expensive and difficult to get, £40 being the average price paid for a horse. Natives do not understand them, and there is the risk of their dying of the dreaded horse sickness, besides the impossibility of taking them to any district where tsetse fly is found.

In addition to coffee some planters grow

TOBACCO,

but no serious attempt has been made in this direction. The tobacco grown here is of inferior quality and badly cured. I am sure that, if good plants were imported from Cuba, Manila, Syria and other tobacco-producing centres, excellent results would be obtained. Experts would have, it is true, to be brought out to train the natives in the various operations of this industry. When I visited Nyassaland seven years ago Messrs. Buchanan Bros. had begun experimenting on these lines and I bought from them splendid yellow tobacco which made cigarettes equal to many of those sold in Egypt. They also turned out cigars as good as any Indian cheroots, but after Mr. Buchanan's death all the machinery was sold and the culture abandoned. At present the tobacco produced is somewhat like the Boer variety of South Africa, and of so inferior a quality that it would hardly find a purchaser at the London Docks.

CHILLIES

are grown in small quantities with splendid results, but no attention is given to their cultivation, as it is feared that large production would bring the prices down. Tea grows well in some parts of the Protectorate, but the process of curing is unknown here. Cinchona has also given satisfactory results, and ramie fibre ought to prove remunerative, since suitable machinery for its treatment has been invented by Mr. Foa, of Limoges.

There is one thing planters urgently claim, and which I have long advocated as well for Rhodesia as for Nyassaland. This is the creation of a

PUBLIC LABORATORY,

to which would be attached a public analyst and an experimental farm. On such a farm experiments would be carried out in all the different cultures under an able specialist, planters being able to send manures and soils to be analysed, and coffee to be tested and valued. They should be able to send their assistants or to go themselves to be taught the cultivation and curing of coffee, tobacco, tea, and other products likely to suit the country. From this institution planters should be able to get an expert to examine their estate, to advise them as to the most suitable methods of improving them, and, from time to time, the superintendent of this institution could publish in the Government Gazette any information likely to prove of use to the planters. To open such an establishment would mean an original outlay not exceeding five to six hundred pounds, and to keep it going would cost less than £1,000 per annum. The greater portion of this expenditure would be covered by the fees paid by the planters, and I am sure that none of them would object to paying six pence per ton on the coffee exported from their estates, if the money were used to cover the cost of maintenance. In addition to the plantations, the most important trade of British Central Africa is india-rubber, a trade which has taken an extraordinary extension within the last few years. While in 1897 the exports of india-rubber amounted to £1,000 only, they had reached £10,000 in 1898. Most of it comes from the west coast of Lake Nyassa, but unfortunately, the natives gather it in so careless a fashion that unless proper supervision is exercised by the authorities all the plants will soon be destroyed. I am told that steps have already been taken to avoid such a result. I will now try to sum up in a few words

THE PROGRESS WHICH HAS BEEN ACCOMPLISHED

since I came here in 1893. Magnificent roads have been built, the most absolute security has been assured throughout the Protectorate, a regular administration has been established in the remotest districts, where justice is rendered exclusively by Europeans, slavery has been completely wiped out, the facilities of communication have increased in a remarkable way, and their cost has considerably decreased. Coffee-planting has passed from the experimental to the practical stage, and the cost has been greatly reduced. Last, but not least, the whole Protectorate has been put in direct telegraphic communication with the Cape and Europe, a result entirely due to Mr Rhodes, without the cost of a single penny to the British Central Africa Administration. I have absolute faith in the future of the country, and I do not share the views expressed by many people as to the precarious state of the coffee industry. The railway from Lake Nyassa to the coast, a thing of the near future, will give a fresh impulse to coffee-planting, and reduce the cost of transport; and if it causes a small exodus of local labour this will be fully compensated by the increase of facilities it will give the natives to come and work on the plantations. It will also relieve the strain now existing on the local resources of labour, so much of which is absorbed by the transport of goods to

and from the Shiré River. The Tanganyika Railway will give a fresh impulse to the opening up of Northern Rhodesia, and when the federation of South Africa is an accomplished fact, Northern Rhodesia and the British Central Africa Protectorate will naturally be included in that great movement. The Protectorate will soon be as ripe for self-government as Southern Rhodesia, so long as it does not stand isolated as it now does, but as part of a system, and its only hope for such a result lies in the prospect of becoming a portion of the Great Federation of the South. This ought to give fresh and increased vitality to the country, and fittingly crown the great work so brilliantly inaugurated by Sir Harry Johnston and continued by Mr Sharpe, who has successfully performed the most difficult of tasks in showing himself able to carry the weight of the heavy legacy left to him by his distinguished predecessor.

THE FOOCHOW TEA TRADE.

DIMINISHED SUPPLIES EXPECTED NEXT SEASON.

The statistics for the season now closed show the Total Export to be 40,342,288 lb against 44,148,650 lb in 1899-1900, 38,718,940 lb in 1898-99, 35,887,522 lb in 1897-98.

As compared with ten years ago, the past season's export shows a falling-off of 33 per cent. The following comparative figures are given to show the changes that have taken place in the destination of the shipments :—

	1900-1901.	1890-91.
	lb.	lb.
Europe	11,299,703	25,661,017
Australia and New Zealand	6,514,722	15,250,738
United States and Canada	11,855,217	3,404,957
South Africa	1,378,864	1,543,652
Coast Southward	4,260,213	4,713,889
,, Northward	5,033,569	8,884,486
..	40,342,288	59,458,739

The comparative figures of the deliveries of China tea in London and Australia are correspondingly disappointing, notwithstanding that the lowness to which prices have made the tea attractive to buyers, if solely on account of its unprecedented cheapness. It has been apparent for some time past that Foochow tea, with insignificant exceptions, is only bought in London to mix with that from Indian and Ceylon, and not then until the importer, tired of holding, parts with it at a price below the cost of production.

Under these circumstances the prospects for the trade are exceedingly gloomy. The Chinese were losers last year and will act with great caution this year. They know, as well as we do, the low scale of prices current in the consuming markets and will run as little risk as possible. Everything points to diminished supplies next season. The money usually advanced about this time of the year is not forthcoming, the native banks giving as a reason for withholding facilities the unsettled state of affairs in the north. Thus the teamen will have to fall back on their own limited resources which the well-informed say may be taken to mean that a considerable portion of the first crop will not be picked at all : and if present current prices in the consuming markets are to be any guide to the Chinese in their later operations in the season the export figures at this date next year will compare very unfavourably with those just published.—*Foochow Echo.*

THE SALE OF NOXIOUS TEAS.

(To the Editor of the London *Times.*)

Sir,—Permit me to refer to and protest against the recent refusal of the Government to use the powers they possess to protect the British tea drinkers from the injurious use of spoilt and damaged teas. For some time past most unpleasant rumours from some of our tea-producing countries have warned us that damaged, and, therefore, injurious, teas were being craftily blended and manipulated and sold as genuine or sound commercial articles. For such purposes "the fine art of blending" was being unworthily used, and should be promptly stopped by the Government authorities. In the Ceylon newspapers, for instance, quite recently, there is a report of a meeting of Planters, called to consider a resolution requesting the Government to supervise or impose checks upon the exportation of unwholesome tea. The mover of this resolution stated, and (what is most significant) he was not contradicted, "that it was well known" that "teas known to be unfit for human consumption" had been exported as tea for sale and consumption. In the examination of a number of recent samples of tea obtained in this country I have been struck by the discovery of dried but perfectly rotten leaf tissues, upon which colonies of microbial forms, both adult and in ova, were found, indicative of damaged and objectionable materials for dietetic use.

I will admit that the adult microbial forms may be destroyed in the process of tea infusion, but the ingestion of the ova and the products of rotten vegetable matter are neither useful nor invigorating to healthy or invalid. If tea was a production of the British Isles, no doubt the Sale of Food and Drugs Act would meet the want and stop the mischief ; but, unfortunately, tea is an imported article, and in its dry rolled condition the consumer sees no suspicious signs, and the chances of detection and conviction are in consequence rendered doubtful and remote ; and, again, should detection result, the guilt might rest upon the ignorant middleman and the real culprit escape.

Instead of throwing the responsibility upon the British local authorities, as the Government seem disposed to do, it would be perfectly easy and simple for the Government to supervise the imported teas at the London, &c., bonded warehouses. These officials would be in touch with the Government experts of the chemical and biological laboratories of Somerset House and South Kensington. In point of fact, such stoppage of "rubbishy tea" would be advantageous to the trade and prove beneficial to the consumer. In this case the truth of the old saw may be again seen—prevention is better than cure.

The Adulteration of Food and Drugs Act is a useful instrument for local authorities in local matters, but as regards teas and other imports we possess the immense advantage of port supervision. Let damaged tea, like diseased matter, be stopped there and the mischief is stopped from circulating, for it is probably the cause of the modern dyspeptic or "I can't drink tea" condition to a far greater extent than many are aware or have idea of.

I am, Sir, yours faithfully, GEO. BROWNEN, F.C.S.

38, Gloucester-place, Boscombe, Hants, April 9th.

—London *Times*, April 13th.

SHARE LIST.

ISSUED BY THE

COLOMBO SHARE BROKERS' ASSOCIATION.

CEYLON PRODUCE COMPANIES.

Company	paid p. sh.	Buyers.	Sellers.	Transactions
Agra Ouvah Estates Co., Ltd.	500	—	900	...
Ceylon Tea and Coconut Estates	500	—	—	...
Castlereagh Tea Co., Ltd.	100	...	85	...
Ceylon Hills Estates Co. Ltd.,	100	—	—	—
Ceylon Provincial Estates Co. Ltd.	500	490	500	..
Claremont Estates Co., Ltd.	100	—	—	—
Clunes Tea Co., Ltd.	100	—	75	—
Clyde Estates Co., Ltd.	100	...	—	--
Doomoo Tea Co., of Ceylon Ltd.	100	...	62,50	—
Drayton Estate Co., Ltd.	100	...	..	
Eila Tea Co., of Ceylon, Ltd.	100	..	40	40
Estates Co., of Uva, Ltd.	500	210	250	—
Gangawatta	500	—	—	..
Glasgow Estate Co., Ltd.	500	—	940	940
Great Western Tea Co., Ltd.	500	..	—	—
Hapugahalande Tea Estate Co.	200	—	—	..
High Forests Estates Co., Ltd	500	..	575	—
Do part paid	400	—	...	—
Horekelley Estates Co., Ltd.	100	—	..	—
Kalutara Co., Ltd.	500	—	250	—
Kandyan Hills Co., Ltd.	100	...	40	—
Kanapediwatte Ltd.	100	—	85	—
Kelani Tea Garden Co., Ltd.	100	—	—	—
Kirklees Estates Co , Ltd.	100	—	120	...
Knavesmire Estates Co., Ltd.	100	—	60	—
Maha Uva Estates Co., Ltd	500	—	400	—
Mocha Tea Co., of Ceylon, Ltd.	500	—	..	...
Nahavilla Estate Co., Ltd.	500	—	300	—
Neboda Tea., Co. Ltd	500	..	500	—
Nyassaland Coffee Co. Ltd	100	—	—	..
Ottery Estates Co., Ltd	100	—	—	—
Palmerston Tea Co., Ltd.	500	...	400	—
Penrhos Estates Co., Ltd.	100	—	100	—
Pitakanda Tea Company	500	—	—	--
Pine Hill Estate Co., Ltd.	60	35	37·50	—
Putupaula Tea Co., Ltd.	100	--	—	..
Ratwatte Cocoa Co., Ltd.	500	—	250	—
Rayigam Tea Co. Ltd.	100	—	42·50	...
Roeberry Tea Co., Ltd.	100	..	60	...
Ruanwella Tea Co., Ltd.	100	—	30	—
St. Heliers Tea Co., Ltd.	500	—	500	...
Talgaswela Tea Co., Ltd.	100	—	35	...
Do 7 per cent Prefs.	100	..	70	..
Tonacombe Estate Co., Ltd.	500	..	325	...
Udabage Estate Co., Ltd.	100	...	...	..
Udugama Tea & Timber Co., Ltd.	50	..	..	..
Union Estate Co., Ltd.	500	...	200	...
Upper Maskeliya Estates Co. Ltd.	500	—	450	—
Uvakellie Tea Co., of Ceylon, Ltd.	100	--	65	—
Vogan Tea Co., Ltd.	100	50	...	50
WanarajahTea Co., Ltd.	500	..	—	—
Yataderiya Tea Co., Ltd.	100	—	300	—

CEYLON COMMERCIAL COMPANIES

Company	paid p. sh.	Buyers.	Sellers.	Transactions
Adam's Peak Hotel Co., Ltd.	100	..	30	..
Bristol Hotel Co., Ltd.	100	..	130	125
Do 7 per cent Debts	100	105	...	—
Ceylon Gen. Steam Navgtn. Co., Ltd.	100	..	225	225
Colombo Apothecaries' Co. Ltd.	100	137	50xd	—
Colombo Assembly Rooms Co., Ltd.	20	15	..	...
Do prefs.	20	...	..	—
Colombo Fort Land and Building Co., Ltd.	100	—	85	..
Colombo Hotels Company	100	..	295	—
Galle Face Hotel Co., Ltd.	100	147·50	150	148·50
Kandy Hotels Co., Ltd.	100	...	125	..
Mount Lavinia Hotel Co., Ltd.	500	—	..	...
New Colombo Ice Co., Ltd.	100	—	210	—
Nuwara Eliya Hotels Co., Ltd.	30	..	27·50	—
Do 7 per cent prefs.	100	...	100	..
Public Hall Co., Ltd.	20	$12\frac{1}{2}$	14	—

LONDON COMPANIES *

Company	paid p. sh.	Buyers.	Sellers.	Transaction
Alliance Tea Co., of Ceylon, Ltd.	10	...	$8\frac{3}{4}$—$9\frac{1}{4}$	..
Anglo-Ceylon General Estates Co.	100	..	35—45	..
Associated Estates Co., of Ceylon	10	..	$1\frac{1}{2}$—[illegible]$\frac{1}{2}$	...
Do. 6 per cent prefs.	10	..	4—6	..
Ceylon Proprietary Co.	1	...	$\frac{3}{8}$—$\frac{6}{8}$	..
Ceylon Tea Plantation Co., Ltd.	10	...	24—25	..
Dimbula Valley Co., Ltd.	5	..	$5\frac{3}{4}$—6	..
Do prefs.	5	..	$5\frac{1}{2}$ - 6	...
Eastern Produce & Estates Co. Ltd.	5	...	$4\frac{1}{2}$ - 5	..
Ederapolla Tea Co., Ltd.	10	...	7—10	...
Imperial Tea Estates Co., Ltd.	10	...	$4\frac{1}{2}$—$5\frac{1}{2}$	..
Kelani Valley Tea Asscn., Ltd.	5	..	5—6	...
Kintyre Estates Co., Ltd.	10	...	6—8	..
Lanka Plantation Co., Ltd.	10	..	4—5	..
Nahalma Estates Co.,Ltd.	1	—	nom	..
New Dimbula Co., Ltd.	1	...	$2\frac{3}{4}$ - 3	..
Nuwara Eliya Tea Estate Co., Ld.	10	...	10 - $10\frac{1}{2}$	...
Ouvah Coffee Co., Ltd.	10	..	6—7	...
Ragalla Tea Estates Co., Ltd.	10	..	9—10	.
Scottish Ceylon Tea Co.,Ltd.	10	—	13—15	..
Spring Valley Tea Co., Ltd.	10	...	$2\frac{1}{2}$—$3\frac{1}{2}$	..
Standard Tea Co., Ltd.	6	..	11—$11\frac{1}{2}$	..
The Shell Transport and Trading Company, Ltd.	1	..	$2\frac{7}{8}$—$3\frac{1}{4}$	.
Uknwella Estates Co., Ltd.	25	—	par	...
Yatiyantota Ceylon Tea Co., Ltd.	10	...	$6\frac{1}{2}$—$7\frac{1}{2}$	...
Do. pref. 6 o/o	10	...	10 - $10\frac{1}{2}$	..

BY ORDER OF THE COMMITTEE.

Colombo, May 3rd, 1901.

* Latest London Prices.

RAINFALL RETURN FOR COLOMBO.

(*Supplied by the Surveyor-General.*)

	1896.	1897.	1898.	1899.	1900	Av of 31yrs.	1901
	Inch	Inch	Inch	Inch.	Inch.	Inch.	Inch.
January ..	2·92	3·81	2·32	6·98	3·72	3·24	11·91
February ..	0·35	1·68	1·98	2·78	0·63	1·89	3·55
March ..	5·64	2·66	4·21	0·88	3·71	4·75	5 12
April ..	5·93	10·97	22·81	6·66	15·12	11·43	8·71
May ..	9·31	8·30	5·80	17·73	10·63	12·04	0*
June ..	8·37	10·14	10·94	9·23	7·83	8·35	
July	2·85	5·24	6·15	1·11	6·77	4·30	
August ..	6·35	9·09	0·97	0·62	7·35	3·79	
September	10·99	4·58	6·90	1·48	4·00	4·93	
October ..	16·78	4·71	20·60	12 99	9·47	14·36	
November..	19.81	11·66	17·38	8·58	9·25	12·55	
December..	11·76	8·89	3-05	4·44	5·20	6·35	
Total..	101·06	82·73	103·11	73·48	83·68	88·03	29·29

* From 1st to 2nd May 0 inch, that is up to 9-30 a.m. on the 2nd May —ED. *C.O.*

FLOWERS WITH PERFUMES.—A German botanist is said to have discovered that out of 4,300 species of flowers cultivated in Europe only 420 possess an agreeable perfume. Flowers with white or cream-coloured petals are more frequently odoriferous than others. Next in order come the yellow flowers, then the red, after them the blue and finally the violet, of which only thirteen varieties out of 308 give off a pleasing perfume. In the whole list 3,880 varieties are offensive in odour, and 2,300 have no perceptible smell, either good or bad.—*Journal of Horticulture*, April 11.

EUCALYPTUS IN LONDON.—Mr Colenso Blogg, of Blogg Brothers, Melbourne, who has returned from his European trip, reports that in spite of the competition of Algerian and other eucalyptus oils the demand for Australian oil is increasing, and the price is rising, but it was evident to him that only oil of a high eucalyptol content could be sold. The result probably will be that inferior oils will be kept in Australia, and the best oils will be sent away, so that as in many other places the country of produce will be worse served than the distant market.—*Chemist and Druggist*, April 13.

COLOMBO PRICE CURRENT.

(Furnished by the Chamber of Commerce.)

EXPORTS.

Colombo, 29th April, 1901.

CARDAMOMS:—
All round parcel, well bleached per lb. R1·50
Do. dull medium do. R1·30
Special assortment, 0 and 1 only do. R2·00
Seeds do. R1·40

CINCHONA BARK:—
Per unit of Sulphate of Quinine 13c—1½ to 3 o/o.

CINNAMON:—
Ordinary assortment per lb. 56c.
Nos. 1 and 2 only per lb. 61c.
Nos. 3 and 4 only per lb. 53c.

CINNAMON CHIPS:—
Per candy of 560 lb R87·50

COCOA:—
Finest estate red; unpicked per cwt R55
Medium do do R52
Bright native, unpicked and undried R49
Ordinary do do do R43
} Market dull.

COCONUTS—(husked).
Selected per thousand R48·00
Ordinary ,, R38·00
Smalls ,, R29·00

COCONUT CAKE—
Poonac in robins f. o. b. per ton R75·00
Do in bags None

COCONUT (Desiccated).
Assorted all grades per lb 16c

COCONUT OIL—
Dealers' Oil per cwt R15·50.
Coconut Oil in ordinary packages f. o. b. per ton R337·50.—Business done.

COFFEE.—
Plantation Estate Parchment on the spot per bus.—None.
Plantation Estate Coffee f.o.b. (ready) per cwt.—None.
Native Coffee, f.o.b per cwt.—None.

CITRONELLA OIL—
Ready do per lb.—50c

COPRA—
Boat Copra per candy of 560 lb. R48·50
Calpentyn Copra do do R48·50
Cart do do do R45·00
Estate do do do R51·00

CROTON SEED per cwt—None

EBONY—
Sound per ton at Govt. depot—R230. As per last Govt. sales of Dec 3rd.
Inferior R155.—As per last Govt. sales of Dec 3rd.

FIBRES—
Coconut Bristle No. 1 per cwt R10·50
Do ,, 2 ,, None
Do mattress ,, 1 ,, 4·00
Do ,, 2 ,, 3·00
Coir Yarn, Kogalla ,, 1 to 8 18·00
Do Colombo ,, 1 to 8 16·00
Kitool all sizes ,, None
Palmyrah ,, None

PEPPER—Black per lb None

PLUMBAGO—
Large lumps per ton R550
Ordinary lumps do 425
Chips do 325
Dust do 180
Do (Flying) 125
} Slightly more enquiry.

SAPANWOOD— per ton None.
SATINWOOD (ordinary) per cubic ft. None.
Do do per cubic ft. None.

TEA—	High Grown Average.	Medium Average.	Low Grown Average.
Broken Pekoe and Broken	cts	cts	cts
Orange Pekoe per lb	54	45	36
Orange Pekoe do	50	41	33
Pekoe do	44	34	29
Pekoe Souchong do	38	27	24
Pekoe Fannings do	30	26	24
Broken mixed—dust, &c	24	21	20

CEYLON EXPORTS AND DISTRIBUTION FOR SEASONS 1900 AND 1901.

COUNTRIES	Black Tea. 1901 lbs.	Black Tea. 1900 lbs.	Coffee—cwt. Plantation	Coffee—cwt. N'tive	Coffee—cwt. Total.	Cocoa cwts.	C'moms lbs.	Cinnamon Bales lbs.	Cinnamon Chips. lbs.	Coconut Oil. 1901 cwt	Coconut Oil. 1900 cwts	Copra cwts.	Desiccated Coconut lb.	Poonac cwts.	Coconuts No.	Plumbago. 1901 cwts.	Plumbago. 1900 cwts.	Fibre. cwts.	Ebony. cwts.
To U K. ..	2392951	36381598	1763	..	1763	21693	95807	289622	108456	45504	80445	3288	1722641	...	4171470	45014	30959	20323	893
,, Austria ..	16975	2569	..	..	...	...	..	5000	5600	772	2220	10324	31201	.	..	...	..	...	...
,, Belgium ...	5025	1880	53	..	53	...	..	20800	34992	1994	125	16720	96390	6625	59650	4003	13628	6778	...
,, France ..	117476	63632	4	...	4	..	1469	17900	3920	...	..	10567	2240	...	406	..	..	246	..
,, Germany ..	83190	108551	..	..	..	934	8003	135100	182308	..	3634	16146	274230	14822	312855	12494	21772	5806	1967
,, Holland ..	11174	2000	...	..	..	..	..	1000	17920	..	...	..	6500	..	..	..	919	569	...
,, Italy ..	5085	2433	..	..	..	..	...	27500	16800	499	..	..	..	...	2995	..	...	...	...
,, Russia ..	2901036	2315235	..	..	...	48	764	...	..	...	..	14210	..	..	..	1474	...	..	..
,, Spain ..	...	11970	..	...	..	..	..	50300	22400	..	..	...	10370	..	..	...	..	..	..
,, Sweden ..	17727	35235	...	..	..	..	..	..	..	199	...	...	6450	..	..	..	105	..	...
,, Turkey ..	13266	7061	...	..	...	...	..	..	...	..	...	...	...	...	...	...	...	..	..
,, India ..	528828	202861	59	..	59	..	629 5	..	.	23077	15016	375	..	...	265900	158	69	..	..
,, Australia ..	5922743	4669260	1127	..	1127	75	...	1800	18144	94	83	..	293251	...	..	134	554	1709	..
,, America ..	924690	1733022	27	..	27	960	696	72100	34553	7007	26253	1	591833	...	..	56995	65345	934	..
,, Africa ..	76096	58633	..	..	..	..	196	..	..	76	...	..	1600	..	394785	...	...	...	..
,, China ..	500490	276023	8	...	8	149	1034	5000	..	707	520	..	65000	..	..	..	..	..	...
,, Singapore ..	40676	30776	..	..	...	646	..	4700	..	...	..	...	..	...	...	..	...	96	...
,, Mauritius ..	8590	...	..	..	..	...	..	..	..	..	..	...	..	..	...	..	..	..	...
,, Malta ..	120630	154053	..	...	..	..	..	...	..	..	..	..	...	..	..	..	..	..	..
Total export from 1st Jan. to 29th Apr 1901	45229648	46056792	3041	...	3041	24505	170884	631322	445183	79929	128296	71631	3101706	21447	5208061	120270	133344	36960	2866

MARKET RATES FOR OLD AND NEW PRODUCTS

(From Lewis & Peat's Fortnightly Price Current, London, April 17th, 1901.)

	QUALITY.	QUOTATIONS.
ALOES, Soccotrine cwt.	Fair to fine dry ..	44s a 85s
Zanzibar & Hepatic ,,	Common to good ..	20s a 60s
ARROWROOT (Natal) lb.	Fair to fine ..	5½d a 6¼d
BEES' WAX, cwt.		
Zanzibar & Bombay { White ,,	Good to fine	£6 a £7 10s
Yellow ,,	Fair ,,	£6 5s a £6 17s 6d
Madagascar ,,	Dark to good palish	£6 10s a £7 5s
CAMPHOR, China ,,	Fair average quality	175s
Japan ,,	... .	185s
CARDAMOMS, Malabar lb	Clipped, bold, bright, fine	2s 3d a 2s 4d
	Middling, stalky & lean	1s 5d a 1s 7d
Ceylon.—Mysore ,,	Fair to fine plump ...	1s 6d a 3s 9d
	Seeds ..	1s 11d a 2s 6d
,, Tellicherry ,,	Good to fine ..	2s 11d a 3s
	Brownish ..	2s 6d
,, Long ,,	Shelly to good ..	1s a 2s 9d
,, Mangalore ,,	Med brown to good bold	2s a 3s 6d
CASTOR OIL, Calcutta ,,	1sts and 2nds ..	4½d a 4¾d
CHILLIES, Zanzibar cwt.	Dull to fine bright ...	35s a 45s
CINCHONA BARK.—lb.	Ledgeriana Orig. Stem	3d a 5½d
Ceylon	Crown, Renewed	5d a 7d
	Org. Stem	3¾d a 5½d
	Red Org. Stem	2⅜d a 4¼d
	Renewed	3d a 5¾d
	Root	3¾d a 4d
CINNAMON, Ceylon 1sts	Ordinary to fine quill	10d a 1s 6d
per lb. 2nds	,, ,,	9d a 1s 5d
3rds	,, ,,	8½d a 1s 4d
4ths	,, ,,	8d a 11d
Chips	,, ,,	2¾d a 10d
CLOVES, Penang lb.	Dull to fine bright bold	4½d a 9½d
Amboyna ..	Dull to fine	4⅜d a 5½d
Zanzibar }	Good and fine bright	4½d a 4¾d
and Pemba }	Common dull to fair	4⅛d a 4⅜d
Stems ..	Fair	1⅝d
COFFEE		
Ceylon Plantation ,,	Bold to fine bold colory	92s 6d a 110s
	Middling to fine mid ..	80s a 90s
	Low mid. and low grown	
	Smalls	50s a 60s
Native	Good ordinary	30s a 70s
Liberian ,,	Small to fine bold	35s a 40s
COCOA, Ceylon ,,	Bold to fine bold	80s a 100s
	Medium and fair	67s 6d a 75s
	Native	55s a 68s
COLOMBO ROOT ,,	Middling to good	12s a 22s 6d
COIR ROPE, Ceylon ton		nominal
Cochin ,,	Ordinary to fair ..	£13 10s a £18
FIBRE, Brush ,,	Ord. to fine long straight	£16 a £19
Cochin ,,	Ordinary to good clean	£20 a £24
Stuffing ,,	Common to fine	£7 a £9
COIR YARN, Ceylon ,,	Common to superior	£15 a £30
Cochin ,,	,, ,, very fine	£12 a £32
do. ,,	Roping, fair to good	£10 a £14 10s
CROTON SEEDS, sift. cwt.	Dull to fair	25s a 35s
CUTCH ,, ,,	Fair to fine dry	23s a 35s
GINGER, Bengal, rough ,,	Fair	34s
Calicut, Cut A ,,	Good to fine bold	80s a 100s
B & C ,,	Small and medium	40s a 77s 6d
Cochin Rough ,,	Common to fine bold	33s a 38s
	Small and D's	30s a 34s
Japan ,,	Unsplit	29s a 31s
GUM AMMONIACUM ,,	Sm. blocky to fine clean	20s a 45s
ANIMI, Zanzibar ,,	Picked fine pale in sorts	£10 7s 6d a £20
	Part yellow and mixed	£8 2/6 a £10 10s
	Bean and Pea size ditto	70s a £9 2/6
	Amber and dk. red bold	£5 10s a £7 10s
	Med. & bold glassy sorts	80s a 100s
Madagascar ,,	Fair to good palish ...	£4 8s a £8
	,, ,, red ...	£4 5s a £9
ARABIC E. I. & Aden ,,	Ordinary to good pale	35s a 55s
Turkey sorts ,,		50s a 75s
Ghatti ,,	Pickings to fine pale ...	12s 6d a 35s
Kurrachee ,,	Good and fine pale ...	52s 6d a 55s
	Reddish to pale selected	30s a 40s
Madras ,,	Dark to fine pale	23s a 35s
ASSAFŒTIDA ,,	Clean fr. to gd. almonds	40s a 90s
	Ord. stony and blocky	6s a 25s
KINO ,,	Fine bright	1s 6d a 1s 9d
MYRRH, picked ,,	Fair to fine palo	90s a 107s 6d
Aden sorts ,,	Middling to good	50s a 80s
OLIBANUM, drop ,,	Good to fine white	35s 6d a 50s
	Middling to fair	25s a 35s
pickings ,,	Low to good pale	18s a 23s
siftings ,,	Slightly foul to fine	16s 6d a 18s
INDIARUBBER, Assam lb	Good to fine	2s 2d a 2s 6d
	Common to foul & mxd.	1s a 2s
Rangoon	Fair to good clean ...	2s a 3s
Borneo	Common to fine	1s a 2s 3d

	QUALITY.	QUOTATIONS
INDIARUBBER, (Contd)		
Java, Sing. & Penang lb.	Foul to good clean ...	8d a 3s
Mozambique ,,	Good to fine Ball ...	2s 6d a 3s 1½d
	Ordinary to fair Ball ...	1s 10d a 2s 6d
	Low sandy Ball ...	1s 3d a 1s 7d
	Sausage, fair to good ..	2s 6d a 3s 1d
	Liver and Livery Ball ..	2s 4d a 3s
Nyassaland	Fair to fine ball ...	2s 5d a 2s 9¼d
	Fr to fine pinky & white	2s 6d a 2s 9d
Madagascar ,,	Fair to good black ..	2s a 2s 6d
	Niggers, low to fine ..	7d a 2s 3d
INDIGO, E.I.	Bengal—	
	Shipping mid to gd violet	3s 4d a 4s 2d
	Consuming mid. to gd.	3s a 3s 4d
	Ordinary to mid.	2s 8d a 2s 10d
	Mid. to good Kurpah	2s a 2s 8d
	Low to ordinary	1s 9d a 2s
	Mid. to good Madras	1s 9d a 2s 8d
MACE, Bombay & Penang	Pale reddish to fine	2s a 3s
per lb.	Ordinary to fair	1s 4d a 1s 11d
	Pickings	1s 3d a 1s 4d
MYRABOLANS, } cwt	Dark to fine pale UG	6s a 7s
Madras }	Fair Coast	5s 6d a 6s
Bombay ,,	Jubblepore	4s 3d a 7s
	Bhimlies	4s 9d a 9s 6d
	Rhajpore, &c.	4s 3d a 8s
Bengal ,,	Calcutta	4s 6d a 6s
NUTMEGS— lb.	64's to 57's	2d 1½d a 2s 6d
Bombay & Penang ,,	110's to 65's	11½d a 2s 1d
	160's to 130's	6d a 11d
NUTS, ARECA cwt.	Ordinary to fair fresh	14s a 17s
NUX VOMICA, Bombay	Ordinary to middling	4s a 5s 6d
per cwt. Madras	Fair to good bold fresh	7s a 10s
	Small ordinary and fair	5s 6d
OIL OF ANISEED ,,	Fair merchantable	5s 6d
CASSIA ,,	According to analysis	2s 8d a 4s
LEMONGRASS ,,	Good flavour & colour	4½d
NUTMEG ,,	Dingy to white	1⅝d a 3d
CINNAMON ,,	Ordinary to fair sweet	3¼d a 1s 6d
CITRONELLE ,,	Bright & good flavour	11d a 1s 0½d
ORCHELLA WEED—cwt		
Ceylon ,,	Mid. to fine not woody..	10s a 12s 6d
Zanzibar. ,,	Picked clean flat leaf ..	10s a 16s
	,, wiry Mozambique	10s a 11s
PEPPER—(Black) lb.		
Alleppee & Tellicherry	Fair to bold heavy ...	6d a 6⅛d
Singapore ..	Fair	6d a 6s 1-16d
Acheen & W. C. Penang	Dull to fine	5¾d a 6⅛d
PLUMBAGO, lump cwt.	Fair to fine bright bold	35s a 40s
	Middling to good small	20s a 32s
chips	Dull to fine bright ..	10s a 20s
dust	Ordinary to fine bright	5s a 10s
SAFFLOWER	Good to fine pinky .	65s a 75s
	Inferior to fair .	40s a 60s
SANDAL WOOD—		
Bombay, Logs ton.	Fair to fine flavour ..	£20 a £50
Chips ,,	... ...	5s a £8
Madras, Logs ,,	Fair to good flavour ..	£20 a £50
Chips ,,	Inferior to fine ...	£4 a £8
SAPANWOOD Ceylon ,,	Fair to good ..	£5 a £5 10s
Manila ,,	{ Rough & rooty to good	£4 10s a £5 15s
Siam ,,	bold smooth ...	£7
SEEDLAC cwt.	Ord. dusty to gd. soluble	50s a 57s
SENNA, Tinnevelly lb.	Good to fine bold green	5d a 6d
	Fair middling medium	3½d a 4½d
	Common dark and small	¾d a 2¾d
SHELLS, M. o'PEARL—		
Bombay cwt.	Bold and A's D's and B's Small ...	£3 10s a £4 15s
Mergui ,,	Small to bold ..	£5 12s 6 a £7 10s
Mussel ,,	Small to bold ...	22s a 60s
TAMARINDS, Calcutta...	Mid. to fine bl'k not stony	15s a 16s
per cwt. Madras	Stony and inferior ..	7s 6d a 11s
TORTOISESHELL—		
Zanzibar & Bombay lb.	Small to bold dark mottle part heavy	14s 6d a 24s 6d
TURMERIC, Bengal cwt.	Fair ...	28s nom.
Madras ,,	Finger fair to fine bold bright	22s a 30s
Do. ,,	Bulbs ..	18s
ochin ,,	Finger ..	24s
	Bulbs ...	6s 9d a 7s
VANILLOES— lb.		
Mauritius ... } 1sts	Gd. crysallized 3½ a 9 in	16s a 26s 6d
Bourbon ... } 2nds	Foxy & reddish 4½ a 8 ,,	15s a 18s
Seychelles 3rds	Lean and inferior ...	8s a 13s
VERMILION lb.	Fine, pure, bright ...	3s a 3s 3d
WAX, Japan, squares cwt	Good white hard ...	33s 6d

THE

AGRICULTURAL MAGAZINE,

COLOMBO.

Added as a Supplement Monthly to the "TROPICAL AGRICULTURIST."

The following pages include the Contents of the *Agricultural Magazine* for May :—

Vol. XII.] MAY, 1901. [No. 11.

A NEW INDUSTRY FOR CEYLON.

THE output of Cacao in Ceylon is not very considerable; in 1900 the quantity exportedw as between 1,600 and 1,700 tons. But as regards quality of produce and market value Ceylon cacao, as the Americans would say, is always 'on top.' That only a very small proportion of Ceylon cacao duce is used in the manufacture of the prepared article can be easily proved by figures and it is therefore clear that a great deal of inferior cacao must enter into the composition of the preparations placed upon the market. But it is an open secret that a good many other ingredients assist in the production of the different brands of cacao powder and chocolate in their various forms, so that the concrete results of manufacture, as carried on on the Continent, are as a rule highly complex mixtures wherein the art lies in the mixing, and the perfection of that art in the concealment of the fact that anything but pure cacao (sweetened it may be with sugar) is used.

When the taste has been vitiated it is no easy matter to educate it to an appreciation of excellence or purity. Coffee, another of our tropical products, has been the object of approved adulteration, and a mixture of coffee with chicory was for a long time more highly appreciated than the pure article. But economical householders may be trusted to recognise before long what is a very clear fact, viz., that it will be cheaper for them to do their own adulteration, and that if there are virtues in the addition of starch to cacao powder (which is problematical) they can make the additions more economically themselves; while the chemist and the family physician may be trusted to complete the victory for the manufacturer of the pure article by reconciling the consumer to the slight natural bitterness of the cacao bean and the true "chocolate colour" which the mixer by his arts has converted into a "burnt sienna."

To Messrs. C. C. Barber & Co., of Grove Estate, Ukuwella, from whose plantations the best of Ceylon cacao reaches the London market, belongs the credit of having started the first factory in the island for the manufacture of cacao powder and chocolate. Their preparations have only just been placed on the Ceylon market, but long enough to secure the high appreciation of all those who have been looking for, and have now found, a pure article; and we have no doubt that the Company's produce has a big future before it outside the island. Prepared on the plantation itself, the raw material used is fresh, uncontaminated by the odours of the ship's hold and of warehouses on this and that side of the ocean, and free from must or rancidity—ready enough to attach any oily seed or preparation. With the saving of freight to and from the West, and crop at hand, the Company have peculiar facilities for turning out a cheap, pure and wholesome article which is bound to have a ready market and a large sale, results which the enterprise of the promoters only deserves.

OCCASIONAL NOTES.

An enterprising Sinhalese gentleman has made a trial shipment of Ceylon fruit (oranges, pineapples, plantains, cajunuts, &c.) to Perth, Western Australia, with a view to ascertaining the possibilities of carrying on a regular fruit trade between the two countries. With many details to be mastered the first trial naturally resulted in a deficit, but not to such an extent as to damp the enterprisng young man's ardour. With experience gained he means to make a second shipment before long, and hopes that in the absence of unavoidable errors and difficulties associated with the first trial, the second will give more promising results. We want more such enterprising men who, with some capital in hand, are anxious to turn it to good account by means of honest trade for the good of their countrymen as well as their own advantage, instead of frittering it away indangerous and reprehensible speculation.

A direct trade in pineapples has now been established between Jamaica and London. We read of a consignment of 500 packages having been received in fine condition and fetching from 1*s.* 6*d.* to 2*s.* 6*d.* per pine. The favourite pine in the London market is the smooth Cayenne, and it is said that the chief reason for this fact is not so much its superior quality but its good looks, size, fine colour and handsome top, the weight ranging from 3 to 8 lbs., the average 4 to 6 lbs. Larger fruit, it is said, are not required in England. Another important fact about this particular variety is that it reaches the market in better condition than any other. Of course a sweet pine is essential for a good market.

The Royal Botanic Gardens Circular, No., 15 has the following note regarding the pine referred to:—"Kew pine" (smooth Cayenne). The best variety for generel cultivation, being a robust grower, usually bearing in the low-country in 6 months from time of planting suckers. Fruit grow to a large size, sometimes weighing over 20 lbs. (exceeding the record for other countries); is very juicy and of a delicious flavour. Leaves not spiny. Suckers of this pine are obtainable from the Peradeniya Gardens at R1·50 per doz.

The proposed Indian Dairy and Agricultural Supply Co. of India is what the Americans would call "a big thing." Among the numerous objects—for the enumeration of which our space is far too limited—are the establishment of dairy farms throughout India and Burma, both for the military and the public, and of breeding depôts, the supplying of milch and ploughing cattle, to teach Dairy Farming and Agriculture, the carrying on of experiments in feeding, &c., cultivation of fodder, the introduction of sterilizing and pasteurizing, the supplying of fodder to Government and the public, the introduction of the co-operative system in dairying, the organising of annual Agricultural and Cattle Shows, the supplying of stud bulls, &c., &c. The Company's operations will be managed by a Board of seven Directors, and the working staff will consist of a Managing Director, two Assistant Directors, one Agricultural and Dairy expert, one Vet, one Medical Officer, one Engineer, one Treasurer and Agent, one Secretary, and such clerical and other staff as may be necessary. Among other details is the arranging with the railway companies for suitable refrigerating vans for conveying milk. The Capital required is estimated at R300,000.

We hear that a local Dairy Company is about to include the manufacture of ice and ærated waters among its operations, which would seem to indicate that their constituents are as solicitous in the matter of "pure milk" as of "iced sodas."

The *Exchange* has the following interesting figures referring to sugar: The English are the largest consumers of sugar in the world. They import 1,500.000 tons every year, equal to 30 % of the world's output of beet sugar. Their consumption of sugar is equal to 86·151 lbs. per head of the population per annum. The next largest consumers are the United States. On the consumption there is only 65·49 lbs. per head. In Denmark the demand falls to 43·65; Switzerland was 42·95 lbs.; France 28·24 lbs.; and Germany only 27·141 lbs., although she is the chief producer of beet sugar. Sugar is thus used more freely in England than elsewhere. The English are the Jam-makers of the world, but the manufacturers import all their sugar and also some of their fruit; and are simply mixers and boilers of the commodity they export to all corners of the earth.

The acme of perfection in the orange world, is as the *Planters' Monthly* of Hawaii remarks, the "Navel." Its superiority over any other variety is admitted all the world over. We have in a previous issue related to the story of the origin of this wonderful fruit.

Dr. Woodbridge, a well-known Agriculturist in California, has succeeded in producing a "Navel" lemon absolutely seedless, and possessing the characteristics and advantages of the orange after which it is named, for he has named the new lemon the California Naval lemon. Besides the entire absence of seed, the texture and thinness of the rind strongly remind one of the model orange which it resembles even to the navel-mark. Here, however, the resemblance stops, for the acidity runs very high.

A king-coconut seedling planted in the grounds of the School of Agriculture on "Diamond Jubilee Day" has already produced its first flower. Taking the age of the seeding when planted at 6 months, it has taken a little under 4½ years to flower.

Mr. D. O'Connor, writing on mangoes in the *Queensland Agricultural Journal*, says:—"If mangoes are not the most extensively grown and abundant fruit in Queensland, they soon will be . . . Almost every one having a garden goes in for mangoes . . . . As an evidence of the in-

creasing appreciation of choice fruit by growers, a seedsman has during the last three years realized 2*s*. 6*d*. each for some fine specimens." Happy seedsman! How the Ceylon fruit seller envies you.

RAINFALL TAKEN AT THE SCHOOL OF AGRICULTURE DURING THE MONTH OF APRIL, 1901.

1	Monday	Nil	18	Thursday	·79
2	Tuesday	Nil	19	Friday	Nil
3	Wednesday	·02	20	Saturday	·16
4	Thursday	·27	21	Sunday	·37
5	Friday	·01	22	Monday	·34
6	Saturday	·52	23	Tuesday	·88
7	Sunday	·60	24	Wednesday	·83
8	Monday	1·02	25	Thursday	·03
9	Tuesday	·26	26	Friday	·04
10	Wednesday	Nil	27	Saturday	2·12
11	Thursday	Nil	28	Sunday	·37
12	Friday	Nil	29	Monday	Nil
13	Saturday	·09	30	Tuesday	Nil
14	Sunday	·14	1	Wednesday	Nil
15	Monday	·05			
16	Tuesday	Nil			
17	Wednesday	Nil		Total..	8·91
				Mean..	2·97

Greatest amount of rainfall in any 24 hours on the 27th, 2·12 inches.

Recorded by C. DRIEBERG.

THE ROYAL BOTANIC GARDENS.

The work of the Botanical Department in Ceylon now comprises a good deal of what bears directly on the Agriculture of the country, and in the absence of a distinct Agricultural Department, this circumstance must be welcomed. The staff of the department has been considerably augmented within the last year or two, and now includes a botanist, an entomologist, a mycologist, and a chemist, besides a temporary assistant who devotes himself to the detailed study of some one particular subject.

Among the more interesting experiments and researches referred to in the annual report of the Director and his staff for last year are (1) the analysis of the black and variously mottled timbers of the Diospyros family, whereby the cause of the discoloration is said to have been determined, while experiments have been initiated with the object of inducing the blackening of the timber in the peripheral sapwood; (2) the efforts (which are reported to promise success) to graft the mangosteen (*Garcinia mangostana*) on the Cochin goraka (*Garcinia xanthochymus*) a more hardy species; (3) the partly successful attempts to propagate the nutmeg by layering and so secure a certain means of raising female trees; (4) the bringing together of over 23 distinct varieties of plantains; (5) the study of the pollination of the cacao tree with a view to produce an increased fertilisation; (6) the attempt to raise cacao plants from cuttings, which, if successful, will be the means of perpetuating the characters of special trees. All such work as is referred to above must help to give us an amount of definite information, which the individual grower is not in a position to ascertain for himself, but which should considerably help him in the practical work of cultivation.

The reports of the Entomologist and Mycologist shew that a great deal of work has been done, and the fact that the advice of these experts is always available must be very consoling to the cultivators of crops.

We have no doubt that the Botanical Department will continue to extend its sphere of usefulness each year under its present Director and his able staff of assistants.

SOME FACTS AND FIGURES ABOUT COW'S MILK.

In a report of investigations made at the New Jersey Agricultural Station, an average analysis of cow's milk is recorded which may be accepted as a guide and useful information on Dairying subjects; but, as the *Cape Agricultural Journal* (to which we are indebted for a summary of the report) remarks, the average, it is to be presumed, is that of the milk of profitable cows:—

Milk is not a product of fixed composition. But the total amount and the proportions of the constituents contained in it are influenced by a variety of conditions, the chief of which is, perhaps, the individuality of the cow. Breed, food, age, health, period of lactation, and time and season of milking are also determining factors. Of the constituents of the dry matter of milk, viz., butter-fat, proteids (chiefly casein and albumen), sugar and mineral salts, fat seems to vary more than the others, though each may vary considerably. Normal milk may be said to contain on the average the following amounts and proportions of the different constituents, also weights in a gallon of 10 lb. 2 oz.:—

	Per cent.	oz.
Water ...	87·50	141¾
Total solids ...	12·50	2 3¼
Butter fat ...	3·50	5¾
Casein and albumen	3·75	6
Milk sugar ...	4·50	7¼
Ash (mineral salts)	·75	1

This average composition has served as the basis in both State and City Governments for the enactment of laws or ordinances, the purpose of which is to prevent watering, skimming, and other forms of adulteration. The standards adopted seldom require more than 12·5 per cent total solids and 3 per cent. of fat. Thus, what may be regarded as the average quality of milk usually exceeds the limit fixed by the various laws, particularly in fat contents.

Normal, or whole milk, will, however, show wide variations in both directions from this standard; that is, it may be very much richer or very much poorer.

The influence of breed is also very marked, so much so that dairy breeds are classified into milk and butter breeds; that is, those which give a larger quantity of poorer quality, and those which give a smaller quantity of a higher quality. The milk from animals which naturally produce large quantities shows average quality, and that from

animals which produce a smaller quantity shows a quality considerably above the average. That the contents of fat in milk varies more than the other constitueuts, is also distinctly shown in the investigations of milk from different cities.

The food is au importont factor affecting the quality of milk, not always appreciated. A specific breed possesses certain capabilities, the values of which are dependent in large measure upon the food that is supplied. Owing to the inherent tendency of the animal to produce milk of a definite composition, food may not exercise a positive and immediate influence in improving the quality of the milk; still, a cow cannot reach her normal capacity in this respect unless she is supplied with sufficient food.

The age and health of the animal also affect the composition of milk. Young animals produce richer milk than older ones, though much depends upon health, vitality and vigour. The period of lactation, that is, the length of time which has elapsed since the birth of the calf, also exercises an influence upon the composition of the milk. The milk flow is usually greatest, and the milk poorest, soon after calving; as the period increases the flow gradually falls off, and as a rule the quality improves. However, the influence of all these factors is not so marked in mixed milk as in the milk of individual animals.

The following notes give an idea of the variation in the composition of milk:—

In one series of analyses the variatiou in total solids ranged from 11·82 to 14·03 per cent, a difference of 2·21 per cent; the variation in fat from 2·99 to 4·57 per cent, a difference of 1·58 per cent. In the case of another series of samples, the total solids ranged from 10·81 to 14·86 per cent, a difference of 4·05 per cent; the variation in fat ranged from 2·56 to 6·92 per cent, a difference of 4·36 per cent.

In the third case the percentage of solids ranged from 10·64 to 13·96 per cent, a difference of 3·32 per cent; the fat from 2·97 to 4·80 per cent, a difference of 1·83 per cent.

In the last series the range in total solids was from 12·06 to 16·55 per cent, a difference of 4·49 per cent; the fat from 3·28 to 7·76 per cent, a difference of 4·48 per cent.

Among these samples was one in which the content of total solids and fat was abnormally low, another contained an undue proportion of fat.

On the whole the samples are reported as extremely good, the average composition of all being total solids 12·97; fat 4·13; casein and albumen 3·37; sugar 4·75; ash ·72 per cent.

A CHEAP WAY OF COOLING.

The *Rural World* describes the cheapest and best method of cooling, particularly suitable for milk, but also available for other purposes as well, by means of sal ammoniac and saltpetre (ammonium chloride and nitrate of potash respectively).

Three pounds each of these ingredients dissolved in a gallon of water will reduce the temperature of a gallon of milk by about 40 deg. F., if the full cooling effect is conveyed to the milk. Here are the directions for use:—The salts, which must be quite dry and ground to a fine powder, are weighed out, put into the measured quantity of water, and stirred slowly about until completely dissolved; the crystals, in going into the liquid form, absorb heat and produce an intensely cold solution. This can be used for cooling purposes, and afterwards, by evaporation, the crystals can be reobtained for use again. Hence, with care there need only be a trifling loss, and the same portion of cooling salts can be used for an indefinite period. When cooling milk by means of freezing mixtures it will be found most economical to reduce the temperature first as much as possible with water only, and then to complete the cooling by means of the cool solution. Thus, to begin with, the milk in the bucket as it comes from the cow will be about 95 deg., and by immediately running it over a cooler through which cold water was flowing it might be cooled down to 75 deg. By then passing it a second time over the cooler through which the cold solution was flowing it could be cooled form 75 deg. down to 55 deg. Thus only half the cold solution would be needed that would have to be used if the whole of the cooling were done by its means. In this way 3 lb. of sal ammoniac, 3 lb. of saltpetre in one gallon of water would then cool two gallons to the desired temperature. At this rate, to cool 50 gallons 75 lb. of each salt would be needed; and as it would be advisable to have two lots, one to be evaporating and drying while the other was in use, 150 lb. of each would be required, or say 1½ cwt. The salts, which, as before stated, must be powdered and quite dry, are best dissolved in a cask or wooden tub, covered with a lid at the top, provided at the bottom with a tap, and wrapped around and nuderneath with 6 in. or 8 in. of straw or thatching to prevent loss of cold. The evaporation of the solution after it has been used should be done in a shallow pan or tray. A number of kerosene tins cut in half lengthwise and provided with handles will do if nothing else can be obtained. Then place over a slow fire, so that the water will evaporate gently without boiling, loss of salt by splashing or spurting being avoided. When the material is evaporated nearly to dryness, the hot, somewhat pasty mass should be dug out of the pan and spread out on clean wood or iron to finish drying in the sun or in some warm, dry place. When perfectly dry it should be powdered up ready for use.

DISEASES OF POULTRY—HOW TO TREAT THEM.

FOWL CHOLERA.—This is one of the greatest scourges of the poultry yard. Fortunately, it is not of frequent or general occurreuce. Uncleanliness and overcrowding are great con tributors to this disease, but we have seen score of fowls die of cholera on our farm, where th birds had the whole farm to roam over and roost

at night in the open air with only a shelter of bark over their heads. There is practically no cure for the disease.

Bronchitis.—Young chickens often develop this disease in wet weather, which can generally be cured, if taken in time, by removal of the affected chicks to warm quarters and feeding them on soft food only, with mustard, ginger, or hot spice added to it. Give them also a tea-spoonful of glycerine twice a day.

Roup.—Roup is one of the highly contagious diseases, and is mostly communicated to healthy birds by the medium of the drinking trough. One sick bird will by this means infect a whole flock. The disease is easily recognised, as the bird's head swells and a foul discharge proceeds from the eyes and nostrils. When the disease has made great headway, it is safest to kill the bird, because a disgusting fungus has grown in the throat, giving rise to the term "diphtheric roup." It is then very dangerous and is communicable to children. The remedies are given in most publications devoted to poultry. Isolate the affected birds; disinfect all their roosts, nests, and houses; destroy or at least thoroughly cleanse with disinfecting fluid all drinking and feeding utensils, and for some time afterwards add a little Stockholm tar to the drinking water. As for the affected fowls, bathe their heads frequently with hot water and Condy's fluid. Use a syringe to clean the nostrils and throat, injecting a solution of bluestone and warm water, sufficient bluestone to turn the water pale-blue. Be sure to prevent the bird swallowing any quantity of this as it is a poison. On first observing the symptoms of roup, give the bird a dose of Epsom salts. Afterwards the best treatment is a pill containing two grains of quinine, morning and night. The only certain way to prevent the reappearance of disease is to kill the affected birds and thoroughly cleanse and disinfect the house and runs.

Scaly Legs.—The cause of scaly legs is a kind of mite which burrows into the skin and causes white scales to appear. Some recommend kerosene as a remedy, but this is too severe; birds often become lame from its application. The best way is to soak the legs in warm water for five minutes, and then rub them with a stiff brush to break the scabs. Then rub in a mild arsenical wash, or sulphur ointment made of ten parts lard, three parts sulphur, and one part crystallised carbolic acid. Usually one application will suffice, and a cure will be had in three or four days.

Lice.—Fowls are infested by four genera and about twenty species of bird-lice. The best treatment for the bird is the dust bath and thorough spraying with powdered sulphur and tobacco dust for the house. Here a hot kerosene emulsion is most effective. Thoroughly spray all the roosts and boxes. Remove the droppings at least once a week. Lice breed in the droppings. The dust bath should be made either in a hollow in the ground or in a roomy enclosure made of three sheets of galvanised iron. Put a quantity of dry road dust in this, mixed with wood ashes and a little tobacco dust. The object of the bath is to destroy the insect parasites. As these do not breathe through the head but through the pores in the body, the dust chokes the pores and the insects die.

Gapes.—The gape-worm (*Syngamus treachealis*) is the most destructive of all the parasites of poultry. It infests the windpipe and bronchi of most land birds, but never of water fowl. The symptoms are the well-known gaping cough or sneeze. The bird seems about to choke.

Treatment.—First remove all the healthy birds to some other place; then kill all the badly infested birds and burn them. If you bury them, earthworms will find and eat the eggs of the parasite and convey the disease to other fowls. Then thoroughly disinfect the pens and yards by sprinkling with a diluted solution of sulphuric acid (two or three pints to 25 gallons of water). If acid is not procurable, use kainit or air-slaked lime, and dust the yards liberally with it. Then give one teaspoonful of turpentine and one of assafœtida in a warm bran mash to each 25 birds A pill of camphor, the size of a wheat grain, pushed down the throat has often given good results. Another good remedy is to remove the fluff from a small feather, except the tip. Moisten this with turpentine or kerosene, and carefully push it down the windpipe, twisting it round. It will kill all the worms it touches, but cannot reach those in the lower bronchial passages. Turpentine and assafœtida in the food soon load the fowl's breath with their fumes, and so kill all the worms in the lower as well as in the upper passages. For drink, give the birds a solution, of salicylic acid—one-third ounce to a quart of water.—*Queensland Agricultural Journal.*

[We have succeeded in stamping out fowl-cholera by the liberal external use of Jeye's disinfectant and giving the birds camphorated water, *i.e.*, drinking water in which a piece of camphor is kept soaking.—Ed. *A.M.*]

BACTERIA AND THE DAIRY.

(*By H. Potts, Dairy Expert, Department of Agriculture, Victoria.*)

(*Concluded.*)

Milk from a healthy cow, and taken under suitable conditions of cleanliness, is free from germ life. During the process of milking, as daily practised at our cow sheds, organisms of various kinds fall into the milk through the medium of the germ laden dust of the shed, the cow's body, the dirty clothes or hands of the milker, the swish of the cow's tail, or the invisible dirt left in the bucket. The most common variety in a cowshed is the bacillus *Deilus lacticus* or lactic acid producing bacteria. They are single cells rodlike in shape, and so small that it requires 20,000 to form a line an inch long, or about 400,000,000 to cover a penny postage stamp, and hence invisible to the naked eye. Milk is a most suitable media for their propagation. Of necessity they must be provided with three conditions to encourage their growth—suitable food, moisture, and temperature. In milk as it leaves

the cow's body they secure these requirements in the most favourable form. Bacteria are vegetable cells and absorb food in like manner to the cells of higher plant life. On reaching the milk they attack the milk-sugar, break it down so as to secure the oxygen associated with it. They disturb the chemical character of the sugar, and through their agency release lactic acid or sourness, carbonic acid gas, and a little alcohol.

After milk is allowed to stand it becomes increasingly sour. This is due to the lactic acid germs, each of which is contributing its quota to the sense of sourness evolved. A study of the germ shows that when immersed in milk the heat maintained at blood or body temperature, they increase by fission, and this is observable every half-hour. This one germ will split in half at the end of the first half-hour, in another it is four, again eight, 16, 32, and so on in progression, and at the end of ten hours this single organism has increased to over a million. To the proper control and development of this family of organisms we are indebted for the correct flavour and other desirable characteristics in butter and cheese. Most organisms, however, may be air dried, and putrefactive germs becoming associated with dried masses of decaying vegetation, stagnant water and drainage, or animal excrement. These are carried about on dust, and contaminate food products. In milk, the milk sugar, casein, and mineral salts provide them with food, and they propagate in similar ratio to the desirable forms, but emit taint, produce false flavors and objectionable odors. These we have to understand and control It is known that most organisms cease to multiply or propagate at 50 degrees F. From this forward the multiplication increases, where food and moisture are ample, to 98 degrees Fah., when the maximum point of propagation is reached. A gradual decline then ensures until we reach what is known as the pasteurising point, viz., 157 degrees F., when the bacteria die. Organisms, such as the lactic acid series, increase by fission, and hence are readily controlled by heat. Other forms, and particularly the putrefactive series, increase by the formation and shedding of spores or seeds, which often resist high temperature, even boiling in water for several hours. Such abnormal fermentations as we get in milk, denominated false curdling, thinny, stringy, bitter, blue, red milk, as well as milk giving off gases, bitter in flavor, and tainted, may be credited to the invasion or presence of peculiar species of micro organisms, as a rule the result of dirty practices at the milking shed, filthy surroundings, impure storage, and other causes at the source of supply. To prove that milk is absolutely free of germ life, and that bacteria produces sourness and creates the fermentative changes in milk, Pasteur's brilliant successor, Duclaux, took a healthy heifer that he milked under strict methods of bacteriological cleanliness into a sterile flask. The precautions observed were such as to ensure the exclusion of germ life from any external source. The flask was hermetically sealed and kept for four years. The only change observable was the rising of the cream. The bottle or glass was then broken, and it was found the milk was as sweet, sound, and as pure as when it left the heifer's udder. Thus Duclaux conclusively demonstrated the contention of bacteriologists that milk is free from germs in the true udder, and to the introduction of germ life is due the fermentative changes. All bacteria possess in a more or less degree mobile power, chiefly through the use of flagelloe. In form they are found as rods, spherical bodies, or spiral.

We apply the knowledge of germs to everyday life in the dairy, where the aim is to suppress dirt and dust. Cleanliness and coolness are the watchwords to be ever remembered by individuals who are associated with every phase of the industry from the milking of the cow to the consumer's table. The cows should be keenly scrutinised at all times for symptoms of ill-health on the first symptoms of which appearing they should be isolated. This applies with equal force to the milker who may suffer from contagious skin or other forms of diseases. Cow and milker are equally dangerous to the consumer's health if diseased. The cows after being leisurely driven to the sheds and quietly bailed up ought to be groomed, *i.e.*, the belly brushed, udder and teats washed and all wiped with a damp cloth. The milker ought to wear clean clothes, have clean hands and finger nails, the latter well pared A clean well scalded bucket is essential. The cow's teats are divided into two chambers, an inner and an outer, the former being controlled by the cow through a sphincter muscle. This completely shuts off the inner chamber from invasion by bacteria. The outer chamber is open to invasion through the teat opening. After each milking there remaind in this part of the teat a small quantity of milk. On returning to the paddock the cow, when lying down, creates a suction in the udder by breathing, which causes the milk to ooze from the teat. This communicates the putrefactive and other objectionable forms of organisms on soil, grass and cows' body. They float into the interior of the teat, where suitable conditions of moisture, temperature, and food prevail, with the result that at the following milking the chamber is swarming with hostile forms of bacteria, and these are milked straight into the bucket or over the milker's dirty hands first, there to propagate and impregnate the pure milk, which follows with taints and other milk disorder. To obviate this, the first tablespoonful from each teat should be kept separate, scalded, and sent to the pigs.

Steam and boiling water are acknowledged as most valuable cleansing and disinfecting agents, yet their application proves insufficient at times. In such cases contamination could be rendered nugatory by a process long followed by housewives, viz., the use of a boiling solution of common washing soda. Scientific experiments have been conducted with resistant forms of germ life, and the most obstinate we know are those which create that terrible disease, anthrax. The spore of this bacillus will resist boiling water and steam for hours, but it instantly dies on being immersed in a half per cent of boiling solution of soda. All spores are thus controlled and dealt with. When

the housewife adds 1 lb. of common washing soda to 20 gallons of boiling water, and applies it hot, she is using one of the most powerful germicides and disinfectants we possess. In all cleansing operations relating to dairying, this germicide, where possible, should be used, followed by rinsing the utensils or vessels with water that has been recently boiled.

Flies are a constant source of bacterial invasion to milk. They convey on their wings and feet innumerable organisms, and generally of a very undesirable class. Potable waters and methods of filtration fail to provide a germ-free water. The filters in ordinary use are shown to be faulty; dripstone, charcoal and other forms were proved to pass pathogenic germs, and hence were useless in preventing typhoid and other germs invading the body. The only filters proved to be reliable were those made of a special isinglazed porcelain with a certain density, and the filtering process only made available by means of high pressure. Filters, such as the Abbott, have been submitted to rigid bacteriolgical tests, and found to supply a germ-free water.—*Statics, Farm and Dairy.*

THE HONEY BEE—ITS LIFE HISTORY.

(*Concluded.*)

THE DRONE.

The function of the males is solely that of fertilising young queens. The excessive number of drones always present in a strong colony during the summer has been a puzzle to naturalists and still more to bee-keepers. By some they were considered defenders, others maintained that they assisted in keeping the young brood warm, and others again believed them to be water carriers, and that they also probably assisted in ventilating the hive. The fact, however, that they lack the defensive organs of the other bees—the sting—makes the drones quite harmless. And as regards keeping the brood warm, this supposition falls to the ground, because they appear mostly in summer when the brood does not require to be constantly covered. During early spring when warmth is most needed in the hive they are generally not present, or only in the larvæ stage, and require external warmth themselves; but towards autumn they are, as a rule, driven out and perish. Except when a colony should become queenless late in the season, the drones are spared and may at times even be allowed to live through the winter. That part of their function is to provide water or keep the hive ventilated is likewise a mere supposition. In fact, when in the hive the drones do nothing but eat, most of the time allowing the workers to feed them. For what purpose, then, are so many as sometimes over two thousand produced by a vigorous colony? It is all important that the young queen should be fertilised soon after she becomes mature, and as the act of coition must take place while on the wing, and at a considerable height in the air, it is necessary that there should be many drones available to ensure her meeting one when issuing on her wedding flight. But another more important fact must be considered. When a young queen ventures out for a martial embrace she will, as likely as not, meet one of her brothers, under natural conditions, probably as a rule. This might lead to deteriorations of the race were it not that in the competition for her possession the strongest and swiftest has the best change to achieve the desire. To secure a prompt fertilisation by *natural selection* combined with *sexual selection* the large number of drones are provided. This view corresponds with the general law of nature. The importance of the drones is enhanced by their numbers. Probably no more than one out of upwards of a thousand copulates, but then his virility may assert itself for upwards of five years.

THE WORKER.

The name "worker," given to the great mass of bees found in a colony, is perhaps the most correctly and justly applied. It is in no way misleading like that of queen, and not derived from a mere peculiarity as that of drone (because the male, owing to the much greater expanse of wings, hums much louder than the rest when flying). The worker has to do everything except reproduce the race.* This they are unable to do owing to their aborted sexual organs, which has suppressed their sexual desires without impairing their love for the young. The queen produces the young, but cannot rear them, and this the workers do with a zest that is without parallel. They divide, so to say, with the real mother the labour and pleasure of maternal care. The welfare of their immature sisters absorbs their whole being. They toil incessantly for the young, and sacrifice, in fact, their lives for them in every sense of the word. Their work begins a few hours after they leave the cradle, and only ends with death. During the first ten days or so they tend the larvæ, seeing that everyone is supplied with the proper nutrition. For this they are best adapted at the early age of maturity, owing to some physiological characteristics. Whilst engaged in this duty they do not fly, except for a short period during the warmest part of the day, round about the hive getting exercise (play), and at the same time making themselves acquainted with their environments. In due course the sealing of the cells over the full grown larvæ has to be attended to, and during the progress of these various operations they cluster more or less thickly on the comb for the purpose of keeping the brood warm. All insects being cold-blooded, sufficient warmth can only be created by them through continued agitation. The bees staying at home engaged in the before-mentioned work are more particularly called "nurses."

Meantime the older bees, also called "foragers," are busy bringing pollen and honey, which is transferred to the nurses for immediate use, or stored in cells handy to the brood nest. These provisions are in several ways elaborated into food for the larvæ. To further liquify the honey

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* As the ovaries are not entirely absent but merely atrophied in the workers, some, under exceptional circumstances, are able to produce eggs. This abnormal phase will be discussed later on.

and to separate the agglutinated pollen grains considerable quantities of water are needed, which are brought to the hive as required. Feeding, moreover, is not merely needed for the development of the larvæ, but this task requires also to be extended to the queen and the drones, and particularly whilst the queen is laying she has to be provided with large quantities of a nitrogenous substance. During the period of her greatest fertility the weight of the eggs deposited per day amounts to more than three times that of the body of the queen. To enable her to balance this exhaustive process, she requires to be supplied with rapidly assimilable food. This the workers elaborate in their bodies and secrete in minute globules, through glands situated near the mouth. The constantly changing retinue which surrounds the queen when laying, escorts her for the purpose of supplying food to her. The addition and dimnution of food re-acts upon her laying power, and is entirely regulated by it. In order to stimulate their virility the drones also require to be fed with nitrogenons food. This the workers produce and supply in the same way as with the queen. and the early stage of the larvæ.

Another important duty is the building of the combs. Without these the young could not be reared nor food stored. When a swarm takes possession of a new home the first work is the construction of new combs, which sometimes proceeds with marvellous rapidity. After a few weeks, when young begin to crawl out, their cradles require to be cleaned and thoroughly smoothed inside, to receive another egg almost immediately. When thousaads mature daily many are kept busy with this work. Partly for protection against enemies as well as against draught, and to keep the light out, every chink and crack is plastered up. This is done with propolis, a resinous substance, gathered specially for the purpose. A number guard the entrance against intruders, and often combats occur to keep aggressors out of the hive. Everything of an obnoxious nature is carried out of the hive, or else imbedded under a wax and propolis covering. The sanitary, as well as the other duties, are under the control of the workers. Some are generally engaged fanning fresh air into the hive, which is done by vibrating the wings. In warm weather this is a very trying exertion, and at times nearly all the members of the colony require to be engaged in this work. The functions of the workers, as we have seen are, manifold. They have to build combs, caulk the hive, refit the cradles for the reception of new inmates, remove objectionable inmates, and sometimes fight them, ventilate the home, keep the brood warm, and feed the other inmates, whether larvæ, queen or drones. They hardly ever rest, for the feeding goes on at night as well as during the day. Moreover, their foresight or innate industry keeps them constantly engaged in storing provisions for future emergencies. All this labour takes their energy greatly, and during the busiest time of life, when plenty of honey and pollen is gathered, and consequently much brood is reared by them, they wear out rapidly. The life of the workers lasts on an average only forty days during the summer, but in times of inactivity continues up to four months and sometimes longer.

GENERAL ITEMS.

Reports reached us, writes the Editor of the *Cape Agricultural Journal*, of a new process for branding stock in New Zealand, which is said to be proving satisfactory in that Colony. It consists in the application on a wooden brand of a caustic which obliterates the hair without injuring the skin. It is stated that the cost of branding 100 cattle only amounts to 15*s*., which is fully compensated for by the sound skins put on the market. As cattle must be marked in some legible and indelible way, any method which may supercede the hot branding iron will prove of great advantage.

The uses of ground-nut oil are numerous, and it has been described as the most polymarphous of all oils, adapting itself to all purposes, including nutrition, lighting, lubrication, and blending. It is the most difficult of all oils to detect when adulterating olive oil, for its chemical reaction is white. The best qualities are used for the table, either pure or mixed with olive (or salad) and sesame (or gingelly) oil; as an illuminant it gives a soft, white light. When neutralised it is much esteemed for lubricating, and is always preferred to cotton seed oil. It is also largely used in the manufacture of soap, and is the characteristic component of the famous Marseilles white soap.

The fruit of the banana contains 72 per cent of water, 2·14 per cent of nitrogenous matter, and 22 per cent of saccharine substance, the latter giving it its great nutritive quality. The banana plant, says M. de Lovedo of Mexico, will feed 150 men from the produce of one hectare ($2\frac{2}{5}$ acres), while the same area of wheat will only supply six individuals; for the same time and under the same conditions of cultivation its produce is forty times that of potatoes and hundred times that of wheat.

Here is a recipe for a good liniment: Take two eggs and put the contents into a bottle, then add half-a-pint of spirits of turpentine and half-a-pint of best imported vinegar. Shake the bottle till the ingredients are well mixed, and in about two hours, with frequent shakings, a white liniment will he produced of about the consistency of cream, when it is ready for use and will improve by keeping.